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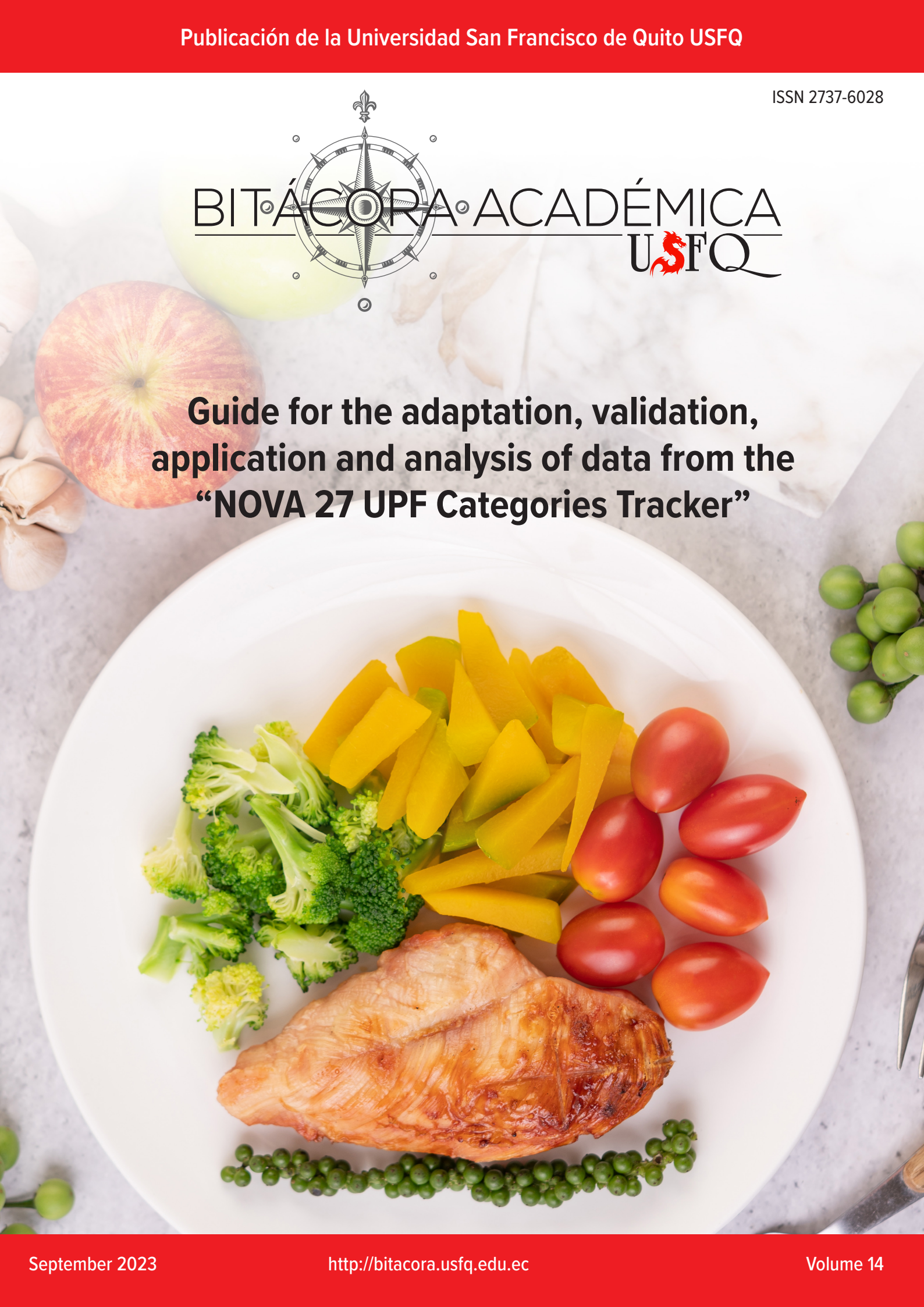

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Guide for the adaptation, validation, application and analysis of data from the "NOVA 27 UPF Categories Tracker"

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Guide for the adaptation, validation, application and analysis of data from the "NOVA 27 UPF Categories Tracker"

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Acknowledgements

It is increasingly evident in food consumption surveys that the food collected needs to be differentiated based on the degree of processing it has been subjected to before its consumption.

People's diets include the consumption of ultra-processed foods and beverages, which are becoming so common that —in many population groups— they represent a significant proportion of the daily diet. These foods usually have added sugar, salt, fats, artificial coloring or preservatives. They are not foods, but rather food extracts with added hydrogenated fats, thickening agents and starches, which are used in both solid and liquid products. These products have a long shelf life, and with these artificial ingredients they have enhanced flavor, making them highly addictive products with an altered nutritional balance, unlike natural ones. In addition, they are cheaper and are available anywhere at any time.

Scientific evidence is more and more conclusive in showing the linkage between ultra-processed foods and beverages and diabetes, obesity, cancer and other health conditions. It is therefore imperative that food consumption studies collect information that allows for classification of foods and beverages based on their degree of processing.

The Manual presented in this publication offers health researchers and advisors an instrument named "27 UPF (ultra-processed foods) Categories Tracker"; validated in Quito for its use in Ecuador in research on food consumption, either in specific studies or in national surveys, to which a module can be added that takes approximately ten minutes to apply.

This Tracker will allow us to quickly and easily determine the caloric content of ultra-processed products in the population's diet, which is relevant information for designing local or national policies and programs that ensure healthy nutrition.

This study was conducted in Quito on a convenience sample, all individuals invited to take part answered the surveys willingly, this allowed to validate the Tracker, for which we are grateful.

We must also mention the field team that gathered background information on the most consumed food products at local markets, redesigned and applied the instruments to ensure their relevance to the study population and also prepared the support material used in the field phase.

The study could not have been possible without NUPENS and IMANA, which provided the technical and financial support necessary to carry out this research, duly establishing the necessary connections with research groups in other countries to exchange experiences, methodologies and instruments.

Lastly, I thank Universidad San Francisco de Quito for offering prompt administrative support throughout the study. Their assistance was certainly essential for the proper completion of the research.

Wilma B. Freire Ph. D.

Main researcher

Table of content

Introduction

The documentation presented here aims to provide researchers and nutrition and food intervention planners with a set of guidelines for the adaptation, validation, application and statistical analysis of the "NOVA 27 UPF (ultra-processed foods) Categories Tracker". This tracker allows us to estimate the consumption of ultra-processed foods and beverages, as well as their caloric contribution to the diet in the 24 hours prior to the interview.

The tracker was designed and validated in Brazil. To apply this tracker to other population groups it is necessary to adapt and validate it. The adaptation and validation took place in Quito, Ecuador, in a population over the age of 18; for this purpose, several instruments were prepared, which is the subject of this guide.

In this regard, a set of documents is presented for consideration, their application ensures standardizing procedures to validate the tracker in other population groups and other contexts, in the country and abroad.

If the tracker is to be applied in other contexts, it is recommended, as a first step, to review and analyze both instruments applied during validation: 1. The "NOVA 27 Categories Tracker" adapted in the country, and 2. the "24-hour reminder" questionnaire used for validating the tracker. Their reading and comprehension will allow to contextualize the following guides. Both instruments are found in the annexes.

This guide presents various documents:

1. Guide for the adaptation, validation, application and analysis of data from the "NOVA 27 UPF Categories Tracker".
2. Surveyor's Manual on the Use of the Photographic Atlas of Standardized Foods and Beverages.
3. Surveyor's Manual on the Virtual Application of the "NOVA 27 UPF Categories Tracker" and the "24-hour reminder" survey, multi-step method.
4. General guidelines for statistic validation of the tracker.

Annexes:

Annex A. "Photographic Atlas of Standardized Foods and Beverages"
Annex B. "NOVA 27 UPF Categories Tracker" "24-hour reminder"
Annex C. Informed consent

Guide for the adaptation, validation, application and analysis of data from the "NOVA 27 UPF Categories Tracker" in Ecuador

Wilma B. Freire

Antecedentes

Background information

Overweight and obesity have reached alarming levels worldwide and they affect all age groups. Furthermore, according to the World Health Organization (1), overweight and obesity will continue to rise in the following decade. It is estimated that the population of children under the age of 5 will increase worldwide from 33.3 million in the year 2000 to 39 million in 2030. The prevalence of obesity among children age 5 to 19 was 20% or more in various countries in the Pacific, Eastern Mediterranean, Caribbean and the Americas. Also, overweight children are at greater risk of being overweight or obese in adulthood. On the other hand, there were 1,900 million overweight adults in 2020, and obese adults reached 0.6 million that same year. Obesity is one of the main risk factors in various chronic diseases, including diabetes, cardiovascular diseases, hypertension and stroke, as well as various types of cancer. (2)

The costs of obesity and associated diseases are on the rise. The estimated cost of health services globally reaches US$ 990 billion per year, which equals more than 13% of the entire health care budget. Indirect costs of obesity include declining productivity, disability, lost years of life and a reduced quality of life. It is estimated that the combined direct and indirect costs of health care make up nearly 3.3% of the total GDP in countries. (3)

Although the main cause of overweight and obesity is an energy imbalance between caloric consumption and expenditure, in summary it is the result of an increase in the intake of high-calorie foods and a decrease in physical activity, issues that are often the consequence of associated environmental and social changes. (1) The consequences of this shift in consumption and physical activity patterns are reflected not only in increased overweight and obesity, but also in non-communicable diseases such as cardiovascular diseases —mainly heart disease and stroke— diabetes, psychomotor disorders and some forms of cancer, all of which result in reduced life quality and premature death. (4, 5)

To face the global rise of these health issues, there are numerous actions that should be taken to reverse this trend. One of them is continuous monitoring of changes in the population's consumption patterns, to uphold policies and programs that protect good nutrition practices, support healthy local food production, as well as also ensuring access to the entire population.

In this context, tools that allow us to monitor shifts in the population's consumption patterns are essential, given that the increase in consumption of ultra-processed foods and beverages containing high levels of fat, salt and sugar, as well as low contents of essential nutrients, is detrimental to healthy diets in which minimally processed fresh foods are predominant —namely, fruits and vegetables that have been consumed for thousands of years in various population groups. (6)

To carry out this monitoring, the "Nova 27 UPF Categories Tracker" is presented as an easy-to-apply instrument. This instrument can be implemented and analyzed quickly, and it also provides data on the consumption patterns of ultra-processed foods and the ratio of calories derived from their consumption. This information is useful to monitor the population's diet behavior and to define and evaluate intervention policies and programs aimed at protecting healthy nutrition. It also allows to compare population groups within a country and between countries.

This tool may be implemented alone or as a module for existing periodic data collection surveys, such as intake and expenditure surveys, employment surveys and food safety surveys, among others.

The tool presented in this document can replace "24-hour reminder" surveys when the UPF caloric intake in the 24 hours prior is to be estimated and if the purpose is to have prompt information that allows to monitor the consumption patterns of these products. Its advantages are that it allows for easy application and data analysis, and can obtain prompt and reliable results for decision making. (7-9)

In comparison, applying a "24-hour reminder" survey —the gold standard for estimating food consumption— is more complex and costly. Moreover, collected data requires complex analysis in order to estimate the population's food consumption. (10) Therefore, not all countries are able to implement a "24-hour reminder" survey for frequent monitoring activities of UPF consumption. Thus, the "NOVA 27 UPF Categories Tracker" is a low-cost and easy-to-implement alternative.

The set of documents presented here offers tools that facilitate the application of this instrument in a specific population or at a national level, either online or in person, to monitor caloric intake and caloric content of UPF.

This tool was designed and validated in Brazil, (11) but in order to apply it to other population groups, it was adapted for use and validation in Ecuador. This allows application of the instrument to other contexts by following the recommendations outlined in this document.

"NOVA 27 UPF Categories Tracker"

The results from the process of adaptation, application, field work, as well as data analysis and validation showed that the tracker can be applied in Ecuador, in other population groups and in other countries by following the steps described later in this document. Thus, its use is recommended for estimating UPF food and beverage consumption and caloric value in the studied population's diet. This recommendation may be very important in other countries if they decide to design and implement programs aimed at promoting healthy nutrition.

This set of instruments will allow us to standardize the procedures to be applied in different population groups, either as a stand-alone survey or as a module of surveys to which the tracker can be added —for example, expenditure or employment surveys, etc.

Originally, the instrument was designed to be self-administered. However, in Ecuador it was applied online. This methodology was also validated for its application in other contexts. This means that the tracker can be applied both in person and online.

Once the instrument is validated, its application does not require special resources or extended times for its analysis and interpretation. (11) The data collected with this instrument provides a high degree of comparability over time, between similar population groups and between countries. (12)

The simplicity of its application provides information that —if collected periodically— allows us to monitor the consumption patterns of ultra-processed foods. This information may be relevant for the formulation of policies, strategies and advocacy programs for healthy nutrition and associated policies.

In essence, the instrument collects data on the consumption of UPF in the 24 hours prior to the interview, in adults over the age of 18, through a list of ultra-processed products grouped into 27 categories, which in turn are grouped into 3 large categories of ultra-processed products. In the first category these groups include beverages such as flavored sodas, flavored yogurts, flavored milks and powdered milk, which are presented in 8 subcategories. The second category includes ultra-processed foods consumed in the day prior replacing a regular meal, grouped into 12 subcategories. The third category includes sweet or salty snacks, also consumed in the day prior, and are grouped into seven subcategories.

Steps for its implementation

Definition of the environment where the “NOVA 27 UPF Categories Tracker” will be implemented.

Once the decision to implement the tracker has been made, either as a stand-alone or as part of a more complex survey, choices about surveyors’ training must be made; the application of the instrument in a sub-sample or the total sample; implementation schedule, either as a stand-alone or as part of a more complex survey; the instrument’s design, whether it is in-person or online, and how to store the data. That is, all steps for the implementation of the tool must be followed prior to the selection and training of surveyors, which is the last activity before field work. Ensuring the implementation of these steps is an essential task to obtain and analyze data successfully.

Adaptation

The tracker used in the country was originally designed and validated in Brazil. (11) In order to use it in Ecuador, two previous steps were taken: the survey was translated from Portuguese into Spanish and the relevance of using the 24 UPF categories in the survey designed in Brazil was analyzed.

To this end, the database of the "24-hour reminder" survey was used, which was applied in the National Nutrition Survey (ENSANUT) 2012. (13) The category corresponding to the NOVA classification was assigned to each food. (14, 15) Next, an additional list of ultra-processed products that were not registered in the "24 hour reminder" survey from ENSANUT 2012 was added. With this more comprehensive list, the 3 categories of ultra-processed products and the corresponding 27 subcategories were established; as described in the General Guidelines document for statistical validation of the tracker, which will be presented later in this document.

After taking these steps, the "24-hour reminder multi-step method" survey was adjusted with the aim of ensuring its applicability in Quito. The data collection categories and the viability of applying the 5 multi-steps were reviewed. (16)

To ensure the proper application of the tracker and the 24-hour survey, the instrument was applied to a trial group consisting of 10 men and women above the age of 18. This activity allowed for identification and verification of the names of the ultra-processed products that are sold and consumed with different names and packagings. The surveyors' degree of understanding of these instruments, as well as the application time and the data collection and recording process were also evaluated.

Two nutritionists were then surveyed to determine the degree of information they need in order to properly apply the tracker and the "24-hour reminder multi-step method" survey and their ability with the NOVA food classification. This activity showed that the surveyors need specific training to be able to recognize foods according to certain degree of processing, that is, according to the NOVA classification (14,15), and to be able to apply the multi-step method in the 24-hour survey.

The instruments were adjusted and the final version was designed using the information gathered in these activities. (17) This validation allowed us to determine that the 27-step tracker and the "24-hour reminder" survey can be applied in Ecuador, being certain that true data will be collected.

Back-up material for the surveyor. "Atlas of Standardized Foods and Beverages"

In order to apply the "NOVA 27 UPF Categories Tracker" and the "24-hour reminder multi-step method" survey, designing an "Atlas of Standardized Foods and Beverages" was necessary (Annex 1). This atlas contains a collection of photographs of foods and beverages grouped into 5 categories and a food coding table. When shown to the survey respondents, they were asked to recognize the foods and beverages consumed the previous day, identifying the photograph of the product and the amount or volume ingested. These 5 categories are:

1. Cooking ingredients
2. Standardized food portions
3. Dishes prepared at home or at restaurants
4. Ultra-processed products and beverages
5. Snacks
6. Food coding

After completing the adaptation of the instruments, as well as of the tracker with the 27 subcategories and the "24-hour reminder multi-step method" survey, and once the "Photographic Atlas of Standardized Foods and Beverages" was prepared, training for the surveyors began.

Training

The training included the materials and instruments designed for this study, the list of foods gathered in the 2012 "24-hour reminder" survey classified following NOVA, (18) the list of ultra-processed products not listed in the "2017 Food Composition Table" and the "Photographic Atlas of Standardized Foods and Beverages".

At the end of the training, the surveyors were evaluated on their ability to identify ultra-processed products consumed locally and differentiate them from other non-ultra-processed foods and beverages, as well as on their use of the NOVA classification to all foods reported in the "24-hour reminder" survey, using the Food Atlas, and conducting the interview within the set schedule while establishing good relations with the interviewees.

Survey application

After completing the training phase, an interview schedule was planned with the people who agreed to take part in the study. They were visited virtually following the interview schedule.

Data analysis

Once data was collected, the database was cleaned and the statistical analysis was carried out, which showed that the instruments adapted to Ecuador were valid and can be applied in other contexts by following the recommendations set forth in this document.

References

(1) World Health Organization. WHO Discussion Paper: Draft recommendations for the prevention and management of obesity over the life course, including potential targets [Internet]. Geneva: World Health Organization; 2021 [cited on June 20, 2023]. Available at: https://www.who.int/es/publications/m/item/who-discussion-paper-draft-recommendations-for-the-prevention-and-management-of-obesity-over-the-life-course-including-potential-targets

(2) NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in body-mass index, underweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. The Lancet. 2017; 390(10113):P2627-2642. Available at: https://doi.org/10.1016/S0140-6736(17)32129-3

(3) Studies. The heavy burden of obesity: the economics of prevention [Internet]. 2019 [cited on June 20, 2023]. Paris: OECD Publishing. Available at: https://www.oecd.org/health/the-heavy-burden-of-obesity-67450d67-en.htm

(4) World Health Organization. Obesity and overweight. Descriptive notes [Internet]. 2021 [cited on June 20, 2023]. Available at: https://www.who.int/es/news-room/fact-sheets/detail/obesity-and-overweight

(5) The GBD 2015 Obesity Collaborators. Health effects of overweight and obesity in 195 countries over 25 years. New England Journal of Medicine. 2017; 377:13-27. Available at: https://doi.org/10.1056/NEJMoa1614362

(6) Pan American Health Organization. Ultra-processed food and drink products in Latin America: Sales, sources, nutrient profiles, and policy implications. Washington, DC: PAHO, 2019.

(7) Martinez JC, Alles B, Touvier M, Hercberg S, Mejean C, San-Cristobal R et al. Contribution of ultra-processed foods in the diet of adults from the French NutriNet-Sante study. Public Health Nutrition. 2018; 21(1):27–37. Available at: https://doi.org/10.11606/s1518-8787.2021055002473

(8) Wang L, Martínez Steele E, Du M, Pomeranz JL, O'Connor LE, Herrick KA, Luo H et al. Trends in consumption of ultraprocessed foods among US youths aged 2-19 years, 1999-2018. JAMA. 2021; 326(6):519-530. Available at: https://doi.org/10.1001/jama.2021.10238

(9) Climent-Mainar C, Martínez-González M, Salas-Salvadó J, Corella D, Schröder H, et al. Integrative development of a short screening questionnaire of highly processed food consumption (sQ-HPF). International Journal of Behavioral Nutrition and Physical Activity. 2022; 19, 6. Available at: https://doi.org/10.1186/s12966-021-01240-6

(10) Namanjeet Ahluwalia N, Dwyer J, Terry A, Moshfegh A, Johnson, C. Update on NHANES dietary data: focus on collection, release, analytical considerations, and uses to inform public policy. Advances in Nutrition. 2016; 7:121–34. Available at: https://doi.org/10.3945/an.115.009258

(11) dos Santos Costa C, Rocha de Faria F, Tiemann Gabe K, Fleury Sattamini I, Khandpur N, Marrocos Leite FH, Martínez Steele E et al. Escore Nova de consumo de alimentos ultraprocessados: descrição e avaliação de desempenho no Brasil. Revista Saude Publica. 2021; 55,13. Available at: https://doi.org/10.11606/s1518-8787.2021055003588

(12) Conway JM, Ingwersen LA. Moshfegh AJ. Accuracy of dietary recall using the USDA five-step multiple-pass method in men: An observational validation study. Journal of the American Dietetic Association. 2004; 104, 595-603. Available at: https://doi.org/10.1016/j.jada.2004.01.007

(13) Freire WB, Ramírez-Luzuriaga MJ, Belmont P, Mendieta MJ, Silva-Jaramillo MK, Romero N et al. Tomo I. Encuesta Nacional de Salud y Nutrición de la Población Ecuatoriana de Cero a 59 Años. ENSANUT 2012. Quito: Ministerio de Salud Pública/Instituto Nacional de Estadísticas y Censos, 2014.

(14) Monteiro CA, Cannon G, Moubarac J-C, Bertazzi Levy R, Louzada MLC, Constante Jaime P. The UN decade of nutrition, the NOVA food classification and the trouble with ultra-processing. Public Health Nutrition. 2018; 21(1):5-17. Available at: https://doi.org/10.1017/S1368980017000234

(15) Monteiro CA, Cannon G, Levy RB, Moubarac J-C, Louzada MLC, Rauber F, Khandpur N et al. Ultraprocessed foods: What they are and how to identify them. Public Health Nutrition 2019, 22(5):936-941. Available at: https://doi.org/10.1017/S1368980018003762

(16) Moshfegh AJ, Rhodes DG, Baer DJ, Murayi T, Clemens JC, Rumpler WV et al. The US Department of Agriculture automated multiple-pass method reduces bias in the collection of energy intakes. American Journal of Clinical Nutrition. 2008; 88:324 –332. Available at: https://doi.org/10.1093/ajcn/88.2.324

(17) Conway JM, Ingwersen LA, Vinyard BT, Moshfegh AJ. Effectiveness of the US Department of Agriculture 5-step multiple-pass method in assessing food intake in obese and non-obese women. American Journal of Clinical Nutrition. 2003; 77, 1171. Available at: https://doi.org/10.1093/ajcn/77.5.1171

(18) Freire WB, Belmont Guerrón P, Jiménez E, Román D, Burgos E. Lista de alimentos, preparaciones y bebidas que se consumen en Ecuador según la clasificación NOVA 2017. Bitácora Académica USFQ. 2017; 5:1-126. Available at: https://revistas.usfq.edu.ec/index.php/bitacora/article/view/1766

Construction of the "Photographic Atlas of Standardized Foods and Beverages" to support the online application of the "24-hour reminder multi-step method" survey and the "NOVA 27 UPF Categories Tracker"

Wilma B. Freire • Andrea Chávez • Elisa Jiménez • Philippe Belmont

Purpose of the "Photographic Atlas of Standardized Foods and Beverages" user's manual

This manual was created to assist in the online application of the "24-hour reminder multi-step method" survey and the "NOVA 27 UPF Categories Tracker".

Data sources for the construction of the atlas

There were 4 data sources used in the creation of the Photographic Atlas of Standardized Foods and Beverages:

- the "Photographic catalogue as a tool to estimate food intake in children and adults" prepared by Chumbi and Vásquez, (1)
- the "Photographic Atlas" from the Aliméntate Ecuador program by the Ministry of Economic and Social Inclusion, (2)
- photographs of ultra-processed products without proof of origin, and
- the "Health and Nutrition National Survey in Ecuadorian Population Aged 0 to 59. ENSANUT 2012», consumption survey chapter. (3)

The "Photographic Catalogue" published by Chumbi and Vásquez (1) and the "Photographic Atlas" published by Aliméntate Ecuador (2) were designed to gather quantified information on the consumption of foods through face-to-face interviews. In both cases, the food recording process was done per portion, assigning codes to differentiate each food and its portion regarding volume and amount in grams or milliliters.

Given that Chumbi and Vásquez's (1) "Photographic Catalogue" and the Aliméntate Ecuador Atlas (2) do not record the ultra-processed products category —which are part of the population's diet— it was decided to add foods and beverages without proof of origin to

the Photo Atlas of ultra-processed foods and beverages. Once the photos were selected from these 3 sources, they were grouped into 5 categories, 65 subcategories and 118 portions.

Characteristics of the "Photographic Catalogue as a tool to estimate food intake in children and adults"

The "Photographic Catalogue as a tool to estimate food intake in children and adults" by Chumbi and Vásquez (1) was based on mainly consumed products in Ecuador's Azuay province. It is made up of 12 categories, displayed in Table 1.

Table 1. Food categories from the "Photographic Catalogue" by Chumbi and Vásquez (1)

1. Soups	5. Salads	9. Oils and fats
2. Meats and charcuterie	6. Fruits and vegetables	10. Dairy products
3. Breads and Cereals	7. Legumes	11. Beverages
4. Tubers and bananas	8. Eggs	12. Others

Each category is divided into various subcategories, to which a letter from A to F is assigned depending on the size or portion of the subproduct and on the number of subproducts. For example, broaster chicken was assigned number 1 and 3 capital letters: B, D, F. Dry chicken was assigned number 2 and letters A, B, C, E, F, G, depending on portion size and weight.

An index is presented at the end of the document, this index records every food by category, the portion of each food with its weight in grams or volume in milliliters. This catalogue registers a total of 87 foods.

"Photographic Atlas of Food Portions"

Aliméntate Ecuador's "Photographic Atlas" (2010) (29) was based on 20 interviews conducted by geographic region in 5 Ecuadorian regions. The interviews were conducted in each selected person's home. Data was collected on the foods consumed on the day of the interview. Pictures were also taken, which were later systematized to reflect weight and measurement equivalencies. Using the systematized data, a code was assigned to identify each portion of each food, in order, from the largest to the smallest.

This atlas presents the 29 most consumed foods of the 5 selected regions. Four photographs were taken of each food that differ in portions, amounts and weights. The photographs show different foods such as cereals, tubers, bread, noodles, vegetables, fruits, meats, eggs, fats and sugars. Prepared foods were also included, such as salads and soups, and also photographs of glasses, mugs and cups.

The food photos collected were grouped according to the classification pattern published by the U.S. Department of Health and Human Services and the U.S. Department of Agriculture. (4) Food and portion sizes were then identified. Afterwards, 10 units of each food were obtained to weigh them according to size and were classified into small, medium, large and extra-large portions.

The procedure described by Nelson and Haraldsdóttir was used for food recording. (5) Each image was coded with numbers and letters, depending on food type, following

the order of presentation of portion images. For example, number 1 was assigned to potatoes; letter A refers to the larger potato, B refers to a smaller potato, C refers to an even smaller potato and D refers to a very small potato.

Inclusion of photographs of ultra-processed products

As mentioned earlier, given that neither Chumbi and Vásquez's "Photographic Catalogue" (1) nor Aliméntate Ecuador's "Photographic Atlas" (2) include ultra-processed products; photographs of ultra-processed foods and beverages purchased in supermarkets in Quito were taken for this document. They were taken out of their packaging to avoid identification of the brands that produce them. The ingredients information provided on each product packaging was reviewed and each product was later coded following the established system.

Construction of the "Photographic Atlas of Standardized Foods and Beverages" to validate the "NOVA 27 UPF Categories Tracker", which focuses on ultra-processed products consumption

The atlas was designed in a first draft after organizing the 3 data sources. This atlas allows to look for each food and beverage reported by the interviewee, since they are able to identify the product and the approximate amount consumed by viewing different photographs of the same product, or a similar one, to that consumed in the 24 hours prior to the interview.

This "Photographic Atlas of Standardized Foods and Beverages" includes 5 categories, 65 subcategories and 118 portions, as shown in the following table.

Table 2. Components of the "Photographic Atlas of Standardized Foods and Beverages"

Categories	Subcategories	Total	Portions
1. Cooking ingredients		4	16
2. Standardized food portions	a. Cereals	5	19
	b. Fruits	6	21
	c. Vegetables	4	15
	d. Tubers, roots and bananas	3	12
3. Dishes prepared at home or at restaurants	a. Soups and second courses	16	56
	b. Home-made beverages	5	11
	c. Others	3	11
	d. Desserts	1	4
4. Ultra-processed products and beverages		11	20
5. Snacks		7	16
Coding and weights			
Total		65	118

The atlas was validated after its development, at the same time that the "NOVA 27 UPF Categories Tracker" and the "24-hour reminder multi-step method" survey were validated. This process enabled us to adjust the atlas, given that they reported consuming products not listed in the atlas, which could lead to misclassification when applying both the tracker and the survey. For example, chocolate made from 100% cacao, which does not belong to the processed or ultra-processed categories, since its production does not include products used by the food and beverage industry. Therefore, this product belongs to the minimally-processed category. Another example is powdered milk, placed in the ultra-processed category, since the ingredient information shows that the company adds sugar substitutes to improve taste. Based on the same criteria, the decision was made to divide the *salchipapas* dish into French fries, which are simply fried in oil, and sausages, which are ultra-processed. Also, coffee and tea produced by the industry were included as ultra-processed beverages. Jello was placed in the fruit-flavored beverages category. Lastly, canned menestra, humitas, quimbolitos and muchines, as well as pre-cooked, frozen and seasoned products, which are also produced industrially, even though they maintain the same appearance as home-made dishes, were added to the ultra-processed list. However, in their industrial form, additives are used to improve their taste, appearance, shelf life, and thus are ultra-processed products.

After validating the atlas, the original list of products was updated and it was decided that, during the interview, the surveyor must ask the interviewee verifying questions regarding the product they report consuming to assign it the proper category in the NOVA system and in the 24-hour questionnaire.

Coding

A unique code was assigned to code the foods in the atlas, which consists of:

- two digits followed by a period,
- two digits followed by a period,
- three capital letters that correspond to the first three letters of the product's name, followed by another period, and
- a lowercase letter beginning with "a" and follows alphabetical order by the number of portions contained in each product.

Under this coding system, the first two digits refer to the category and the following two digits refer to the subcategories within each category. For example, in the sugar chart, sugar portions are recorded as 01.01.AZU.a; 01.01.AZU.b; 01.01.AZU.c or 01.01.AZU.d to indicate one, two, three or four portions, respectively.

Each code also corresponds to a specific weight the interviewee reports having consumed. The code selected by the interviewee is recorded in the "ORGA AUX Final Survey (standardized food and beverages)" sheet, which is the database being built as each interview is conducted. (See annex 1)

Application of the "Photographic Atlas of Standardized Foods and Beverages"

The atlas was developed as supporting material for applying the "24-hour reminder" survey in an online interview (e.g., via Zoom) or in person, and for applying the "NOVA 27 UPF Categories Tracker".

To apply it with the tracker, which is the first questionnaire used in the interview, it must be noted that it begins with a quick check-up in which the interviewee identifies, from the list presented to them, each food consumed in the previous day. This interview should last no more than 5-10 minutes, however, if the interviewee needs to confirm what they consumed in the previous day, a photograph of the corresponding (or the most similar) UPF product from the atlas they claim to have consumed, to confirm the selection of the UPF product chosen initially.

When applying the "24-hour reminder" questionnaire, the interviewee is asked on each food consumed and its amount. To ensure that the reported amount, portion or volume consumed is closer to the real portion consumed, a photograph of the product from the atlas is shown to select the one that resembles the most to what they consumed. If the atlas does not include a photo of the product reported by the interviewee, a photo of the product closest to the reported product is shown to choose size or volume consumed.

Since the survey data entry is automated, once the interview is finished, data is already recorded in the "ORGA_AUX Standardized Foods and Beverages: Final Survey Database" Excel sheet. The database is built automatically, which, in Ecuador, was moved to KOBO Open data kit (6), and which in other countries may be moved to another electronic platform.

References

(1) Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901

(2) Aliméntate Ecuador. Atlas fotográfico. Porciones de alimentos. Quito: Ministry of Social and Economic Inclusion; 2012.

(3) Freire WB, Ramírez-Luzuriaga MJ, Belmont P, Mendieta MJ, Silva-Jaramillo MK, Romero N, Sáenz K. Tomo I. Encuesta Nacional de Salud y Nutrición de la Población Ecuatoriana de Cero a 59 Años. ENSANUT 2012. Quito: Ministerio de Salud Pública/Instituto Nacional de Estadísticas y Censos, 2014.

(4) U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2015-2020 Dietary Guidelines for Americans. 8th ed. [Internet]. 2015 [cited on June 20, 2023]. Available at: https://health.gov/our-work/nutrition-physical-activity/dietary-guidelines/previous-dietary-guidelines/2015

(5) Nelson M, Haraldsdóttir J. Food photographs. Practical guidelines II. Development and use of photographic atlases for assessing food portions size. Public Health Nutrition 1998, 1: 1231-7. Available at: https://doi.org/10.1079/phn19980039

(6) Hartung C, Lerer A, Anokwa Y, Tseng C, Brunette W, Borriello G. Open data kit: tools to build information services for developing regions. In Proceedings of the 4th ACM/IEEE International Conference on Information and Communication Technologies and Development; New York: Association for Computing Machinery; 2010. p. 1-12. Available at: http://www.nixdell.com/classes/Tech-for-the-underserved/Hartung.pdf

Surveyor's manual on the online application of the "NOVA 27 UPF Categories Tracker" and the "24-hour reminder" survey, multi-step method

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Introduction

This manual was created to train the surveyors who will be in charge of applying the electronic versions of the "NOVA 27 UPF Categories Tracker" and the "24-hour reminder multi-step method" questionnaires.

Aspects to be considered by the surveyor

The first aspect is considering the interviewer's behavior during the interview. They must keep in mind that, during interaction with the interviewee, their behavior will influence the interviewee's behavior and how they answer the questions. Thus, it is necessary to consider the following recommendations.

Privacy and place. At the beginning of the interview, ask the interviewee to ensure that no third parties are present; and if possible, keep them isolated during the interview by closing the interview room to avoid noises or possible interferences.

- Remind them that the interview will las approximately 40 minutes and includes 2 questionnaires.

- First, an explanation of the information to be collected in both questionnaires and the duration of each one will be given. The first one could last between 5 and 10 minutes; the second, approximately 35 minutes. An explanation will be given that a photographic atlas of standardized foods and beverages will be used as supporting material to allow the respondent to identify the food, dish or beverage that most closely resembles what they consumed the previous day.

Surveyors' attitude. During the interview, the surveyor must apply the following recommendations.

- Be friendly. At the beginning, the surveyor should greet and explain the objective of the interview. They should speak comfortably, using clear, appropriate and paced language.

- Be respectful. Respect for the interviewee must be shown always and address them looking at them in the eyes in a horizontal dialogue with the interviewer. Survey application should appear to be a normal conversation.

- Be observant. Be observant and write down any event that affects the interview process and the data collection.

- Be an examiner. Thoroughly examine data provided by the informer. Do not assume to know the answers. Always do research with help from the "Photographic Atlas of Standardized Foods and Beverages".

- Be neutral. The interviewer must be neutral when asking questions to probe aspects related to food consumption.

  The interviewer should never influence answers when asking questions. Do not mention the names of possible food consumed, this may lead the interviewee to change their answer to please the interviewer. For example, never state a question this way: "Did you add sugar to your coffee?" or "Did you use sunflower oil to fry the scrambled eggs?"

- Be discreet. At all times during the interview, the interviewer should be very discreet and avoid verbal, facial or bodily expressions when examining the type and amounts of foods prepared and consumed by the interviewee.

  For example, do not show discomfort when having to repeat questions because the interviewee does not understand. It is inappropriate to show surprise due to the amount of food ingested or the portion size served or consumed.

- Be patient. Patience is necessary. Do not ask questions and speak endlessly. Pauses will allow the interviewee to think clearly and feel more confident.

- Be ingenious. Be creative to collect the necessary information regarding the weight of foods used in preparations and regarding portions served and consumed. To this end, the interviewer should be able to adapt to the conditions of the interview, to the food available to the interviewee and to the examples that can be used from the "Photographic Atlas of Standardized Foods and Beverages" for estimating portions and volumes consumed and to identify the type and size of utensils.

- Be thorough. Do not be pleased with quick answers, and even less so with shallow ones. Inquire thoroughly about portion sizes reported by the interviewee, as well as the volume and weight of products selected from the "Photographic Atlas of Standardized Foods and Beverages".

  The surveyor's responsibility is to collect reliable and truthful data, by completing the information in a comprehensible manner during the interview.

First contact with the interviewee. Before the interview

First contact aims at making an initial approach to invite them to take part in the study as respondent. The user will be explained the details of their participation and the duration of the interview. It will also be explained that the interview will be online via Zoom, for which a link will be provided that will activate at the time and date of the interview. They will be informed regarding the "Photographic Atlas of Standardized Foods and Beverages", which will be used as support material to refine their answers.

If they accept participation, a date and time will be scheduled for the interview.

Interviewer's training

To apply the "NOVA 27 UPF Categories Tracker" and the "24-hour reminder multi-step method" tools, interviewers must be trained and standardized prior to the application of both questionnaires. This training is essential to reduce errors and biases in data collection and variability in recorded data.

If the number of interviewers needed is greater than 2, pre-selection of at least 3 interviewers is recommended to select the 2 best interviewers after training, and to have additional staff in case one of the interviewers has to be replaced if they stop participating in the survey.

In addition to training surveyors on how to conduct the interview, record the data, verify the record and save the information collected, the first task of the training should be to ensure that surveyors master the NOVA classification and learn to identify foods according to their degree of processing. When mastering the NOVA classification, surveyors will be able to assign the reported product to the appropriate category. To this end, the list of "Foods, preparations and beverages consumed in Ecuador according to the NOVA classification" is recommended (1).

For this training, the studies carried out in Brazil on the NOVA system (2, 3) and the food composition table for Ecuador, which was updated for this study (4), are also recommended.

The training session to identify foods based on their degree of processing should be theoretical and practical, and should be conducted after the surveyor's general training. For this training, it should be noted that, although NOVA classification is easy to understand, its application requires practice when interpreting the product's label, nutritional composition and ingredients used in production. Also, the surveyor must be able to identify, in the local market, products that appear to be made with fresh foods, but that —being produced by the industry— contain ingredients only used at industrial level to improve color, appearance and taste, etc. In this case, these are ultra-processed products.

At the end of training, surveyors should be familiar with the preparations usually consumed by the population, which may be evaluated with help from the "Photographic Atlas of Standardized Foods and Beverages" based on appearance, consistency and portions. Thus, the surveyor will help the interviewee remember food consumed the previous day.

Interviewers, after completing training, should be able to recognize and help the interviewee recognize the different foods, based on the NOVA classification of 4 groups (1-3).

Application of the electronic questionnaire

Both surveys are presented in the same questionnaire, made up of 4 sections:

- "Informed consent form";
- "Respondent identification";
- "NOVA 27 UPF Categories Tracker";
- "24-hour reminder multi-step method".

This document presents the questionnaires in Word format. For its electronic application, it must be translated into a user-friendly software, as used in the Ecuador study, which was the Kobo Open Data Kit program (5).

Informed consent

The interviewee will be contacted on the date and time scheduled for the interview. Before applying the first questionnaire, the interviewee will be asked to read the "Informed consent form", which must have been previously approved by an institutional review board (IRB) after the study, itself, has been approved. The text in this document may vary according to the requirements from the specific committee and the form of application (online or in-person). Likewise, the way to record agreement or disagreement to participate may vary. After its reading, consent will be required to take part in the study. If participation is accepted, the survey will begin immediately.

Then, the respondent will be informed that 2 questionnaires will be administered during the interview, also the time it will take to answer each one and the importance of answering as accurately as possible, when considering the question being asked. They will be informed that the first questionnaire will last 5 to 10 minutes and the second will last approximately 35 minutes.

They will be informed that the purpose of this study is to identify the foods consumed on the day before and to identify which of these are ultra-processed and which are not; furthermore, that consumption refers to what they consumed the previous day from the moment they woke up until the moment they went to bed. They will be asked to answer as precisely as possible, when considering the question being asked.

Lastly, they will be informed that —during the interview— support material will be used in the form of a "Photographic Manual of Standardized Foods and Beverages", which consists of a set of photos of different products that will be shown to the interviewee when they report what they consumed on the day prior to the interview; this will help them inform with greater precision size, volume or amount of product consumed the previous day.

Interviewee identification

After completing the "Informed consent form" and after providing the aforementioned explanations, the first part of the interview will begin: interviewee identification. Their phone number, age in years, months and days, sex and education level (elementary, high school or higher) are recorded. Next, the date of the interview and the weekday when the interview took place are recorded.

Table 1. Interviewer ID

Interviewer ID							
Phone number							
Age (date of birth: yyyy-mm-dd)							
Sex:	Female				Male		
Education:	Elementary						
	High school						
	Higher education or university						
Date of survey (yyyy-mm-dd)							
Day on which diet information was collected	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Application of the "NOVA 27 UPF Categories Tracker"

After completing the "Respondent identification", the "NOVA 27 UPF Categories Tracker" interview will begin. The interviewee is reminded that the application of this questionnaire will take approximately 10 minutes and does not require an educational level from the interviewee, nor great memory. It will be pointed out that this is a quick list that refers to what was consumed the previous day, from the moment the interviewee woke up until the moment they went to bed.

> **Note for the interviewer:** The list of groups and subgroups reflects the type of each product consumed. Therefore, if the food informed by the interviewee does not appear on the "Photographic Atlas of Standardized Foods and Beverages", the answer will be recorded following the NOVA subcategory that most closely resembles. An unlisted ultra-processed product is assumed to belong to the same category as the one that is listed and their similarity is obvious.

The questionnaire records the consumption of the 27 subcategories in 3 groups: (a) beverages consumed the previous day with 8 subcategories, (b) foods consumed as part of regular meals (with 12 subcategories) and (c) snacks consumed at any time during the previous day (with 7 subcategories).

When conducting the interview with the "NOVA 27 UPF Categories Tracker", the order of the 3 product categories must be followed, ensuring that the answers are as

accurate as possible. Find support in the "Photographic Atlas of Standardized Foods and Beverages" if necessary.

Table 2. "NOVA 27 UPF Categories Tracker"

Tómese unos minutos para recordar todos los alimentos y bebidas que consumió ayer, desde que se levantó hasta que se fue a dormir			
	See this list of beverages and tick off all the ones you ate yesterday	**See this list of foods and tick off all the ones you ate yesterday**	**See this list of snacks and tick off all the ones you ate yesterday**
Tick off the foods consumed yesterday	01. Sodas, soft drinks, regular or light	01. Sausage, chorizo, French fries and sausages, hamburgers or nuggets	01. Bagged chips or crackers or any other type of branded, salted and bagged snack
	02. Fruit-flavored or prepared from powdered mix beverages or jello	02. Seasoned and pre-cooked meats	02. Sweet cookies with or without filling
	03. Bottled or Tetra Pak fruit-flavored beverages	03. Ham, salami or mortadella	03. Cereal bars
	04. Bottled or Tetra Pak chocolate beverages	04. Canned menestra	04. Industrial cake, not homemade nor muffin, brand-name cake or powdered pancake or cake mixes
	05. Bottled or Tetra Pak tea or coffee beverages prepared from powdered mix	05. Sliced bread or industrial bread	05. Polito or similar non-homemade nor artisanal ice cream
	06. Any type of flavored yogurt, including liquid yogurts	06. Margarine	06. Chocolate bars, bonbons, candies and chewing gum
	07. Flavored milk	07. Mayonnaise, ketchup or mustard	07. Packaged breakfast cereals
	08. Powdered milk	08. Bottled salad dressing	0. Did not eat yesterday any of the foods on this list
	0. Did not drink yesterday any of the beverages on this list	09. Frozen or fast-food restaurant French fries	
		10. Humitas, quimbolitos, cassava bread, muchines, plantain empanadas, pre-cooked or frozen bonitísimas	
		11. Frozen or fast-food restaurant pizza	
		12. Noodles or spaghettis or instant powdered soups	
		0. Did not eat yesterday any of the foods on this list	

Once the application of this questionnaire is completed, the interviewee is thanked and asked to remain online (when the interview is online) to continue with the "24-hour reminder multi-step method" questionnaire.

Application of the "24-hour reminder multi-step method" questionnaire:

The "24-hour reminder multi-step method" questionnaire will be administered once the "NOVA 27 UPF Categories Tracker" is applied. The purpose of this questionnaire is to validate the "NOVA 27 UPF Categories Tracker" in the population under study to estimate the caloric contribution of ultra-processed foods in the diet of the studied population.

The application of the "24-hour reminder multi-step method" questionnaire will last approximately 35 minutes. It will allow the collection of data on food consumption for

the same time period from the previous day, from the time they wake up until they go to bed. The interviewee should have absolute freedom to report everything they ate, regardless of the time or place they ate it.

Table 3. "24-hour reminder multi-step method"

<table>
<tr><td rowspan="8">Tell me everything you ate and drank yesterday; from the time you got up until the time you went to bed.

(Allow the interviewee to talk about all foods and beverages consumed. Do not interrupt. After they finish, ask them to define the type of cooking used for each food. Example: roasted, fried, cooked, others).</td><td rowspan="8">roasted,
fired,
cooked,</td><td>1. bb</td><td>1 at home</td><td rowspan="2">grams (g)</td><td rowspan="8">Portions</td><td rowspan="2">Light</td><td></td><td rowspan="2">1. minimally processed</td></tr>
<tr><td>2. b</td><td>2 office</td><td></td></tr>
<tr><td>3 .mm</td><td>3. neighborhood store</td><td rowspan="2">mililiters (ml)</td><td rowspan="2">Regular</td><td></td><td rowspan="2">2. cooking ingredients</td></tr>
<tr><td>4. l</td><td>4. restaurant</td><td></td></tr>
<tr><td>5. ma</td><td>5. street vendors</td><td rowspan="3">Atlas code</td><td rowspan="3">Does not apply</td><td></td><td rowspan="2">3. processed</td></tr>
<tr><td>6. d</td><td rowspan="2">6. fast-food restaurant</td><td></td></tr>
<tr><td>7. ad</td><td></td><td>4. ultra-processed</td></tr>
<tr><td colspan="9">Multi-step</td></tr>
<tr><td>step 1</td><td>2</td><td>3.1</td><td>3.2</td><td>4.1</td><td>4.2</td><td>5.2</td><td>5.3</td><td>5.4</td></tr>
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</table>

Multi-step method

PTo minimize the underestimation inherent to the "24-hour reminder multi-step method," the interviewer will guide the interview using the multi-step method, which involves applying the interview in 5 steps. These steps are iterative and complement each other to capture as accurately as possible the interviewee's food consumption.

To ensure greater reliability of the data, the "Photographic Atlas of Standardized Foods and Beverages" will be shared with the respondent during the interview. This tool will be used to allow the interviewee to choose the photo that matched the product they consumed in terms of portion size and appearance.

> If the "Photographic Atlas of Standardized Foods and Beverages" does not include a product similar to the one consumed, they will be asked to choose a photo of the one that most closely resembles the product they consumed.

To validate the instrument in Quito, the multi-step method (6) was adapted according the eating habits of the population that is to be interviewed, after a pre-test including 10 people.

Aspects to consider when applying the 5 multi-steps

When applying the 5 steps, the surveyor must keep in mind the following objectives of each step.

STEP 1. Quick list

Objectives:

- List, without interruptions, all foods consumed between the first and last meals on the previous day.

- Record the foods reported by the interviewee. Begin with the following question.

> "Mr. or Ms. We are going to ask you about what you ate yesterday (day of the week). Please, tell me everything you ate and drank since you woke up in the morning until you went to bed at night".

In this step, everything that the participant remembers must be written down in the order they remember it. Many people will remember the foods in chronological order (time of meal), but frequently beverages are recalled out of order or omitted in many cases.

After recording everything the interviewed person reported about eating and drinking, go to step 2.

> The interviewee should feel that they are free to tell at length and without interruption everything they remember regarding what they ate the day prior. If there are no interruptions, the person remembers best.

STEP 2. List of omitted foods

Objective:

- List the type of cooking used on the food.

Go back to the top of the list and retrieve data of the foods frequently forgotten. Ask how the food was prepared —fried, in a soup or packaged, etc.

> "Other than what you already mentioned, did you drink or eat anything else yesterday?"

The following food categories should be mentioned as a guideline: home preparations (minimally processed such as omelets), processed such as canned fruit juice (NOVA group 3, canned products) or ultra-processed (ready-to-eat NOVA group 4).

Table 4. Food category guide

	NOVA			
	Group 1	**Group 2**	**Group 3**	**Group 4**
Other beverages	Home-made fruit juices, natural yogurt, morocho, coladas, milkshakes, oatmeal, tapioca, infusions, rosero, champús, colada morada, coconut water, coffee, chocolate (prepared in water or milk), alcohol-free cocktails. Sodas.			Bottled juices; fruit-flavored beverages; chocolate beverages; tea, canned, bottled or Tetra Pak coffee prepared from powder; any type of flavored yogurt.
Sweets	Sugar, bee honey, panela honey, home chocolate, water-based ice cream, espumilla, creamy ice cream (Salcedo style), paila ice cream, dulce de leche, syrup, sweet guava paste, colaciones, suspiros, aplanchados, nogadas, lollipops, candies, chewing-gum, caramelized toasted corn (caca de perro), garrapiñada (caramelized peanut), among others, prepared at home.		Cookies, snacks, sweets, cereal bars, industrial ice cream, chocolate bars or sweetened breakfast cereal	
Desserts	Pristiños, rice pudding, fruit in syrup, figs with cheese, flan, custard, fritters, cakes, among others.			Jello, frozen or semi-frozen desserts, ready to serve, cookies for baking, Amor, Oreo cookies.
Sauces and dressings		Oil and others, natural dressings.		Packaged dressings, Chinese sauce, soy sauce, vinegar, chili, mustard, mayonnaise, ketchup, tomato paste, stock cubes.
Fried foods	All types of empanadas, bolones, tortillas, patacones, chifles, cassavas, industrialized fried foods (chips, cheetos, doritos, nachos, fried pork skin and similar), emborrajados, muchines, corviche, among others.		If packaged: All types of empanadas, bolones, tortillas, patacones, chifles, cassavas, industrialized fried foods (chips, cheetos, doritos, nachos, fried pork skin and similar), emborrajados, muchines, corviche, among others.	
Street food	Roasted viscera (tripa mishqui), skewers, plantain with cheese, roasted corn.			Fast food (salchipapas, hot dogs, French fries, hamburgers, papipollo, pizza), ham, salami, empanadas, among others.
Home-made traditional snacks	Tamales, humitas, quimbolitos, chigüiles, cassava bread, among others.			
Industrialized traditional snacks				Tamales, humitas, quimbolitos, chigüiles, cassava bread, among others.
Natural fruit	Pear, apple, peach, berries.			
Canned fruit			Peaches, cherries, fruit cocktail.	
Vegetables	Lettuce, tomato, chard, celery.			
Breads and cookies	Non-industrial breads.			Industrial breads.

STEP 3. Time and place of meal

Objective:

- Record the time when the food was served and the place it was eaten.

This step has 2 parts: 3.1 and 3.2.

Go back to the top of the list and determine the time and name of the place where each food or preparation was consumed. In this step, food is given a chronological order based on the time of the meal.

Step 3.1. Start at the beginning of the list. Ask when each food was consumed, using the following codes: 1 before breakfast (bb), 2 breakfast (b), 3 mid-morning (mm), 4 lunch (l), 5 mid-afternoon (ma), 6 dinner (d), 7 after dinner (ad).

Step 3.2. Ask the place where each food was consumed and record the answer: 1 home (1hom), 2 office (2ofc), 3 store (3sto), 4 restaurant (rst), 5 street vendor (Svn), 6 fast-food restaurant (FFR), street food at a local, 7 vehicle.

Beverages and food consumed between meals will possibly be out of order, especially foods forgotten by the respondent. (Step 2). Therefore, go back to the top of the list and ask two key questions: the type and time of the meal.

Begin with the following phrase.

> "Let's order the foods and beverages according to meal times (3.1. I will then ask you the place where you consumed each food or preparation (column 3.2)".

STEP 4. Amount consumed

Objective:

- Record the portion(s) and measurement unit of the product consumed and recorded in the Photographic Atlas of Food and Beverages.

Go back to the top of the list and provide a detailed description of each food or preparation reported and the amount consumed. Each food event and time is reviewed. Ask if foods were consumed at home or elsewhere. At this moment, and not before, amounts and other details are recorded with help from the "Photographic Atlas of Standardized Foods and Beverages".

Step 4.1. Record the unit from the "Photographic Atlas of Standardized Foods and Beverages" reported as consumed.

Step 4.2. Record portions consumed of the food selected from the "Photographic Atlas of Standardized Foods and Beverages".

STEP 5. This step records three types of information

Objective:

- Record if the product packaging reports whether it is light or not, the brand and location according to NOVA classification.

Step 5.1. Go back to the top of the list and obtain information that the respondent can recall. When using the memory aid, there may be valuable information at the place of consumption: vehicle, while shopping, cooking, or cleaning.

Step 5.2. Record whether or not the product is packaged and whether or not it has a record that determines whether or not the product is light.

Step 5.3. Record the brand name of the product. The respondent is asked if he/she knows the brand name of the product.

Step 5.4. At the end of the survey, the surveyor assigns the product the number that corresponds to it according to the NOVA classification: 1, 2, 3, or 4.

Before concluding the interview, a step-by-step review will be done to see if the interviewee remembers anything he/she did not report.

Aspects to consider when applying the "24-hour reminder multi-step method"

Definitions

Portion size: Defined as the amount of food that the respondent reports having consumed, by selecting the photo from the "Photographic Atlas of Standardized Foods and Beverages".

To gather this information, the "Photographic Atlas of Standardized Foods and Beverages" will be consulted. If the Atlas does not include said food, the food code that most closely resembles the food reported by the interviewee will be used as the one consumed, and the code is registered.

Obtaining weights and measures: To properly estimate the amount of food consumed, the "Photographic Atlas of Standardized Foods and Beverages" must be used.

The food weight or volume should be reported following the codes shown in the "Photographic Atlas of Standardized Foods and Beverages", which shows that most foods have 3 or 4 alternatives of portions per food, either in grams or milliliters.

It is essential that the interviewee constantly uses the "Photographic Atlas of Standardized Foods and Beverages". If the Atlas does not include the food with the measurement code, the food that most closely resembles will be chosen for recording. For example, if the Atlas includes the image of 4 portions of a barley soup, but the intention is to record a quinoa soup not included in the Atlas, the measurement of the barley soup will be recorded.

To this end, the respondent must be able to classify foods such as meats, cereals, legumes, vegetables, dairy products, etc.

Method for obtaining the weight or measurement of different foods, ingredients or preparations

To obtain the weight or volume of different foods or preparations, do as follows.

Liquids. The interviewee will be shown the packaging in the Atlas to choose the packaging photo that most closely reflects the volume consumed.

Spreadable fats (butter, margarine, peanut butter, sesame butter, cream cheese). To estimate the amount consumed, the interviewee will be shown the corresponding Atlas page that shows images of spreadables, such as butter, and is asked to describe the amount shown in the image that most closely reflects what they consumed. The reported code is then recorded.

This same procedure may be used for jams, Nutella and other spreadable products.

Breads, donuts, cakes. Ask the interviewee to use the Atlas and select the size that most closely resembles the item consumed. Make sure the interviewee chooses either the minimally processed or the industrialized product.

If necessary, ask one more time to ensure to which NOVA group the reported product belongs.

Fruits. When using the Atlas, ask the interviewee to choose the image of the fruit that most closely resembles in amount or unit consumed.

Vegetables. When using the Atlas, ask the interviewee to choose the image of the vegetable that most closely resembles the amount consumed.

Tubers. When using the Atlas, ask the interviewee to choose the image of the tuber that most closely resembles the amount consumed.

Cheeses. When using the Atlas, ask the interviewee to choose the photo of estimated type and size.

Meats. When using the Atlas, ask the interviewee to choose the image of the meat that best reflects what they consumed. Record if the meat is marinated or not. If marinated meat was consumed, place it in the NOVA group 4.

Ice cream scoop. Estimate size and width of the portion using the Atlas and inquire if the product is industrial or home-made.

Cookies. Ask to select portion size per unit. Ask if the cookies are industrialized or home-made, while using the Atlas.

Snacks. If the snacks are made at home or in small businesses, portion size will be estimated according to the amount consumed and reported by the interviewee. If they are ultra-processed, tag them as such and record the amount consumed.

Grains (beans, lentils, chickpeas, peas). The consumed portion size is estimated using the Atlas. Inquire whether the product was prepared at home, at a home restaurant or at a chain restaurant.

Cereals. Rice or wild rice. The consumed portion size is estimated using the Atlas.

Eggs. The egg size and units consumed are estimated using the Atlas.

Soups. The size and type of soup consumed is estimated based on the Atlas.

Pasta. The consumed portion size or volume is estimated based on the Atlas.

Mixed dishes. Preparations that require several solid ingredients for their preparation, for example: stuffed rice, salads, tuna omelette, among others. To estimate portion size or volume, ask the interviewee to select, from the Atlas, the amount of product consumed.

Sugar. Ask the interviewee to inform the amount of sugar consumed according to the Atlas.

Charcuterie. Ask the interviewee to mention the amount of charcuterie consumed based on the graphs in the Atlas.

Materials and equipment needed for training, fieldwork and data collection

The following files must be installed on the surveyors' computers or tablets:

- "Electronic questionnaire";
- "Photographic Atlas of Standardized Foods and Beverages";
- "Aid sheet";
- "NOVA 27 UPF Categories Tracker";
- "24-hour reminder multi-step method" for Zoom interview.

References

(1) Freire WB, Belmont Guerrón P, Jiménez E, Román D, Burgos E. Lista de alimentos, preparaciones y bebidas que se consumen en Ecuador según la clasificación NOVA 2017. Bitácora Académica USFQ. 2017; 5: 1-126. Available at: http://bitacora.usfq.edu.ec

(2) Monteiro CA, Cannon G, Levy RB, Moubarac JC, Louzada MLC, Rauber F, Khandpur N, Cediel G, Neri D, Martinez-Steele E, Baraldi LG, Jaime PC. Ultraprocessed foods: What they are and how to identify them. Public Health Nutrition. 2019; 22(5), 936-941.

(3) dos Santos Costa C, Rocha de Faria F, Tiemann Gabe K, Fleury Sattamini I, Khandpur N, Marrocos Leite FH, Martínez Steele E, da Costa Louzada ML, Bertazzi Levy R, Monteiro CA. Escore Nova de consumo de alimentos ultraprocessados: descrição e avaliação de desempenho no Brasil. Revista Saude Publica. 2021; 55, 13. Available at: https://doi.org/10.11606/s1518-8787.2021055003588

(4) Ramírez-Luzuriaga MJ, Silva-Jaramillo KM, Belmont P, Freire WB. Tabla de composición de alimentos para Ecuador: Compilación del equipo técnico de la ENSANUT-ECU 2012. 2014. Quito: Ministerio de Salud Pública del Ecuador.

(5) Hartung C, Lerer A, Anokwa Y, Tseng C, Brunette W, Borriello G. Open data kit: tools to build information services for developing regions. CTD. 2010 Dec; 13-15. Available at: http://www.nixdell.com/classes/Tech-for-the-underserved/Hartung.pdf

(6) Lois Steinfeldt L, Anand J, Murayi T. Food reporting patterns in the USDA. Automated multiple-pass method. Procedia Food Sciences. 2013; 2, 145-156.

“NOVA Tracker”: Statistical validation of the “NOVA Tracker” as an instrument that captures ultra-processed food consumption

Phillipe Belmont • Wilma B. Freire

EIn Ecuador, overweight and obesity (ow/ob) reach alarmingly high levels of prevalence in adult and adolescent population. Sedentary habits, loss of dietary diversity and consumption of ultra-processed foods (UPF) are among the identified factors that increase the prevalence of ow/ob, which are part of a phenomenon identified as nutritional transition. The development of the agro-industrial sector, along with the urban lifestyle, contributes to a shift in eating patterns, increasing the risks of chronic non-communicable diseases. This transition occurs when “traditional” diets are replaced with fewer basic foods and greater UPF consumption (1).

These changes in consumption patterns need to be monitored; however, methods employed to date, be it 24 hours or consumption frequency, are costly and their data require long processes for their analysis and interpretation.

Therefore, it is necessary to have a simple, low-cost instrument that allows permanent and periodic monitoring of UPF caloric intake, to obtain timely data to support policy and program decisions that protect healthy eating practices and substantiate the need to adopt healthy food production and supply programs.

In this sense, the objective of the research conducted in Ecuador was to adapt and validate a short food-based filter that estimates the dietary participation of UPF in the population’s diet. This instrument is the “NOVA 27 UPF categories Tracker”, which was originally designed in Brazil, with 24 categories.

Objectives

The tracker’s validation in Ecuador had 2 objectives:

- Standardize the methodology, taking into consideration the various contexts and regions.

- Promote and include this tool in the local statistical agendas from the Health/ Nutrition National Surveys (public or NGO) with the purpose of mapping UPF intake trends over time and facilitate regional comparisons.

Methodology

This tool was designed and validated in Brazil (2) to collect the caloric value of ultra-processed foods. The validation proved to be sufficiently effective to measure the caloric contribution of ultra-processed foods in the Brazilian population's diet.

Due to the potential applicability of the tool, its low cost and the timeliness of the data it provides for decision making, the decision was made to adapt and validate the instrument in Ecuador. The first step was to identify frequently consumed ultra-processed foods and beverages, based on the ENSANUT survey (3). This survey collected consumption data by applying the "24-hour reminder" questionnaire to a population of 19,932 individuals between 6 and 60 years of age.

For this survey, data was collected from a sample of 327 individuals between 18 and 70 years of age, men and women, in which the "NOVA Tracker" and the "24-hour reminder multi-step method" survey were applied. Results of the analysis showed a coincidence in the most consumed food items, at various levels, respecting regional specificities and preserving the items shared between regions.

This information enabled the design of the "NOVA Tracker", with 3 categories and 27 subcategories of ultra-processed products, that is, 3 additional subcategories compared to the tracker designed in Brazil. Categories remained the same as those identified in Brazil, that is, beverages, prepared foods and snacks.

To validate the instrument designed for Ecuador with 27 subcategories, each of the 27 subgroups of ultra-processed products was given a value of 1 if the product had been consumed, totaling 27 if all were consumed. Subsequently, to validate the tracker, the results of its application —in terms of caloric intake of ultra-processed products— were compared to the results of the application of the "24-hour reminder" in adult population over 18 years of age, men and women, in Quito.

To sum up, the methodology analysis for the validation was performed in 3 stages:

i. Adaptation of the list of main UPFs based on ENSANUT 2012 (3).
ii. Data collection for debugging and pairing the composition table with the "24-hour reminder" survey.
iii. Concordance analysis.

Tracker development

Foods and beverages on the "24-hour reminder multi-step method" survey collected in the ENSANUT (3) were classified according to NOVA (4). This list of foods and beverages allowed to filter ultra-processed products into 3 categories and 27 subcategories that records UPF consumption in Ecuador.

As a result, the main items that contribute to the caloric intake of ultra-processed products in adult Ecuadorian population, national average, were identified, as shown in Table 1.

This table shows the average caloric content of the main ultra-processed foods, with a 95% confidence interval at the lower and upper ranges of the calculation. The table also reports the average percentage contributed to the total caloric intake.

Table 1. Main items that contribute to the caloric intake of ultra-processed products in adult Ecuadorian population, national average (3)

Food	Average calories	95% inferior CI	95% upper CI	% cal. cons.
Soda (black, red, yellow)	35.2	29.3	41.1	1.5
Bread (food industry)	42..5	33.6	51.5	1.8
Fruit-flavored beverage (pwd.mix)	14.4	8.4	20.3	0.6
Coffee (instant coffee with sugar)	9.9	6.2	13.6	0.4
Yogurt (with artificial flavors)	6.3	5.2	7.5	0.3
Ice cream (all brands)	4.6	2.8	6.4	0.2
Mortadella (all brands)	4.1	3.2	5.0	0.2
Margarine (all brands)	3.9	3.0	4.8	0.2
French fries with sausage	3.8	2.0	5.6	0.2
Chorizo	3.8	2.4	5.1	0.2
Cacao (powder, all brands)	3.7	3.0	4.3	0.2

UPF scoring was calculated as the sum of the reported UPF subgroups among those 27 listed, with a minimum score of 0 and a maximum score of 27.

It is worth noting that this exercise was possible in Ecuador due to the existence of a national "24-hour reminder" survey. In the absence of sources of ultra-processed food consumption such as the "24-hour reminder" surveys, it is advisable to select the main UPF foods consumed and reported in focus groups or by expert sources (such as Euromonitor) and other secondary data.

"24-hour reminder multi-step method"

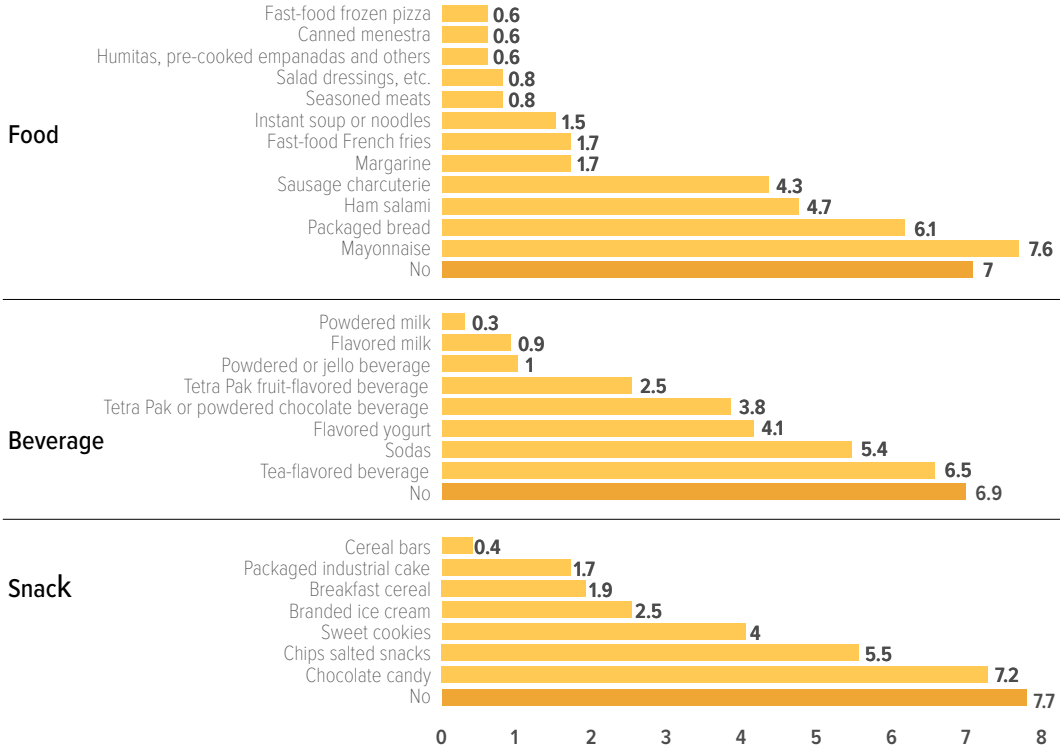
The "NOVA Tracker" and the "24-hour reminder multi-step method" survey were applied to the 327 adult subjects over the age of 18, both sexes, in an interview that lasted between 10 and 30 minutes on average, respectively.

The multi-step method allows the respondent to remember numerous times the foods consumed the previous day.

1. Participants inform, quickly and without interruptions, all foods and beverages consumed on the previous day, from the time they wake up until they go to bed.
2. The surveyor inquires about other foods and beverages the interviewee may have forgotten, based on the list of informed products.

3. The participant is then asked about the type, time and place of each meal; followed by details on the form of preparation, origin, amount, home measurements and sizes, as well as adding other foods (for example, sugar).
4. The interviewer lists the entire report to the interviewee, reviewing and promoting that the informer remembers forgotten or omitted products.

The following graph shows the frequencies of scores from the tracker, collected from the sample sorted by ultra-processed subgroup.



Graph 1. Frequency of tracker responses obtained in the validation phase

Concordance analysis

The distribution of ultra-processed food consumption was calculated according to the quintiles of the contribution of ultra-processed foods to total caloric intake and the approximate quintiles of the tracker score (NOVA) for ultra-processed foods consumption. Distribution comparison was based on the PABAK concordance index, applying a quadratic weight correction to take into account the unbalanced distribution of the categories (5).

Each difference in category was considered uneven in its contribution to agreement, since the difference between the first and second category is considered less important than the difference between the second and third category, and so on, therefore, quadratic weights were used to assess agreement. Concordance reached 0.81 with very good concordance strength.

Table 2. Example of results obtained in the validation phase

Nova sc/ Q %UPF	[0.2)	[2.3)	[3.4)	[4.5)	[5.12]	Total
[min.,Q1)	%	%	%	%	%	%
[Q1,Q2)	%	%	%	%	%	%
[Q2,Q3)	%	%	%	%	%	%
[Q3,Q4)	%	%	%	%	%	%
[Q4,max.)	%	%	%	%	%	%
Total	%	%	%	%	%	%
PABAK.est	PABAK.lower		PABAK.upper		Prop.agree.obs	
Strength_of_ agreement	Low	Reasonable	Moderate		Good	Very good
PABAK	<0.2	0.21-0.40	0.41-0.60		0.61-0.80	0.81-0.40

Thus, the measurement was validated using the tracker, which showed a high level of concordance with the consumption recorded in 24 hours, establishing that the tracker adequately measures the caloric contribution of ultra-processed foods in a qualitative manner.

References

(5) Popkin BM. Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases. The American Journal of Clinical Nutrition; 2006, 84(2):289-298. Available at: https://doi.org/10.1093/ajcn/84.1.289

(6) Costa CS, Faria FR, Gabe KT, Sattamini IF, Khandpur N, Leite FHM, et al. Escore Nova de consumo de alimentos ultraprocessados: descrição e avaliação de desempenho no Brasil. Rev Saude Publica. 2021, 55:13. Available at: https://doi.org/10.11606/s1518-8787.2021055003588

(7) Freire WB, Ramírez-Luzuriaga MJ, Belmont P, Mendieta MJ, Silva-Jaramillo MK, Romero N et al. Tomo I. Encuesta Nacional de Salud y Nutrición de la Población Ecuatoriana de Cero a 59 Años. ENSANUT 2012. Quito: Ministerio de Salud Pública/Instituto Nacional de Estadísticas y Censos, 2014.

(8) Monteiro CA, Cannon G, Moubarac J-C, Bertazzi Levy R, Louzada MLC, Constante Jaime P. The UN decade of nutrition, the NOVA food classification and the trouble with ultra-processing. Public Health Nutrition. 2018; 21(1):5-17. Available at: https://doi.org/10.1017/S1368980017000234

(9) Lamarine M, Hager J, Saris WHM, Astrup A, Valsesia A. Fast and Accurate Approaches for Large-Scale, Automated Mapping of Food Diaries on Food Composition Tables. Frontiers in Nutrition 2018; 5(38). Available at: https://doi.org/10.3389/fnut.2018.00038

Analysis code (cran R)

```
# Distribution (%) according to the fifths of the dietary share of ultra-processed foods and
# (approximate) fifths of the Nova score for the consumption of ultra-processed foods.
library(dplyr)
tb <- frame_matrix(~QUPF,~N0_1,~N2_3,~N3_4,~N4_5,~N5_max,
           «min-Q1»,47,30,8,0,1,
           «Q1-Q2»,11,22,16,11,7,
           «Q2-Q3»,5,15,17,11,15,
           «Q3-Q4»,3,6,16,12,28,
           “Q4-max”,0,3,11,11,41)
#Función de análisis de concordancia
qpabak <- function(dat,conf.level) {
  q <- ncol(dat)
  weights <- 1 - (abs(outer(1:q, 1:q, “-”))/(q - 1))^2
  n <- sum(dat)
  pa <- sum(weights * dat/n)
  pk. <- (dat %*% rep(1, q))/n
  p.l <- t((t(rep(1, q)) %*% dat)/n)
  pe <- sum(weights * (pk. %*% t(p.l)))
  pabak <- (2*pa)-1
  SD <- sqrt((pa*(1-pa))/((1-pe)^2))
  SE <- SD/sqrt(n)
  CIupper <- (pabak)+(qnorm((1+conf.level)/2)*(SE))
  CIlower <- (pabak)-(qnorm((1+conf.level)/2)*(SE))
  result<- data.frame( pabak.est   = pabak,
                       pabak.lower = CIlower,
                       pabak.upper = CIupper
  )
  return(result)
}
qpabak(tb,.95)
```

ANNEXES

Annex A

Photographic Atlas of Standardized Foods and Beverages

Annex B

NOVA 27 Categories Tracker

Annex C

Informed consent

ANNEX A

Photographic Atlas of Standardized Foods and Beverages

Photographic Atlas of Standardized Foods and Beverages developed to support the application of the "24-hour reminder multi-step method" and "NOVA 27 Categories Tracker" questionnaires, which record the consumption of ultra-processed foods and beverages.

This atlas was created based on the following publications and photos published by the industry on the Internet.

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901

Aliméntate Ecuador. Atlas fotográfico. Porciones de alimentos. Quito: Ministry of Social and Economic Inclusion; 2012.

Photos taken from publications on the food and beverages industry's websites, regarding processed and ultra-processed products.

The graphics used in this compilation were taken from the publication of Chumbi Cordero et al., 2018, with permission from the authors, to use them as support for the online application of the 24-hour reminder multi-step method and the NOVA 27 Categories Tracker questionnaires, which record the consumption of ultra-processed foods and beverages. Graphics from MIES' Photographic Atlas were taken from the publication in which Wilma B. Freire —author of this publication— assissted in its production; lastly, photos of ultra-processed products were taken from the food industry's websites.

Objective

Serve as support instrument for the online application of the "24-hour reminder multi-step method" and the NOVA 27 Categories Tracker questionnaires, which record the consumption of ultra-processed foods and beverages.

Instructions for code interpretation

A unique 2-digit code was assigned for food coding. Followed by a period, 2 more digits, followed by a period. Then, 3 capital letters that correspond to the first 3 letters of the product's name, followed by another period and, lastly, a lowercase letter that begins with "a" and follows the number of portions presented in each product. For example, the first graph —regarding sugar— records 4 portions of sugar 01.01.AZU.a; 01.01.AZU.b; 01.01.AZU.c; 01.01.AZU.d. Each code represents a specific weight identified by the interviewee as having consumed.

The code selected by the interviewee is recorded in the ORGA_AUX_Final_Survey (standardized food and beverages) Excel sheet, which is the database being built as each interview is conducted.

Content

1
Cooking ingredients

Sugar

01.01.AZU.a

01.01.AZU.b

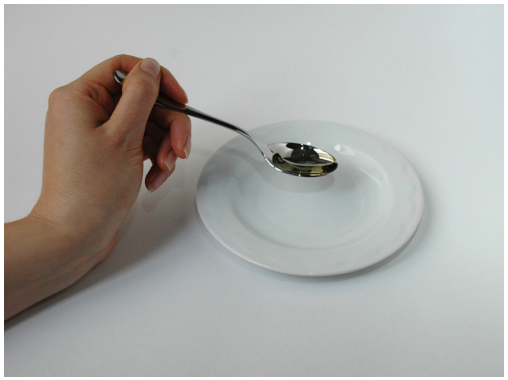
01.01.AZU.c

01.01.AZU.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

Oil

01.02.ACE.a



01.02.ACE.b

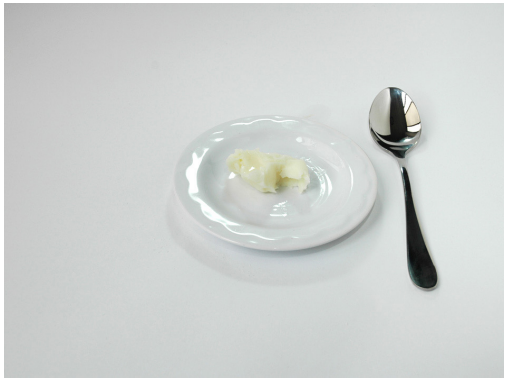
01.02.ACE.c

01.02.ACE.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

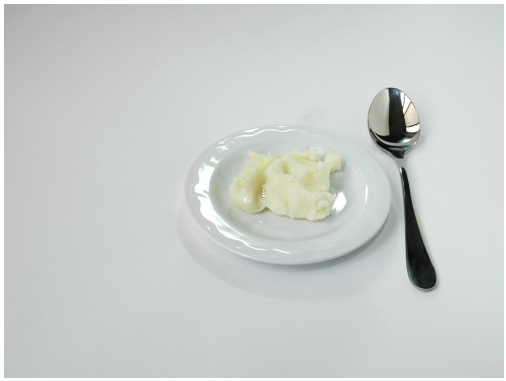
Lard

01.03.MAN.a



01.03.MAN.b

01.03.MAN.c



01.03.MAN.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

Salt

01.04.SAL.a

01.04.SAL.b

01.04.SAL.c

01.04.SAL.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

2

Standardized food portions

a. Cereals

Cooked white rice

02.01.ARR.a

02.01.ARR.b

02.01.ARR.c

02.01.ARR.d

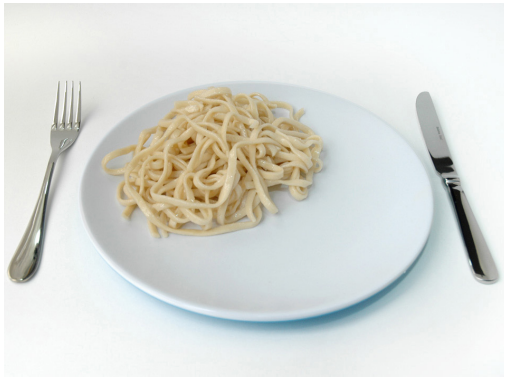
02.01.ARR.e

02.01.ARR.f

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Cooked noodles

02.01.FID.a



02.01.FID.b

02.01.FID.c

02.01.FID.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

Cooked mote

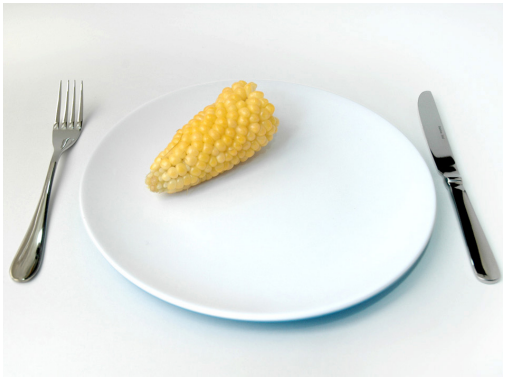
02.01.MOT.a

02.01.MOT.b

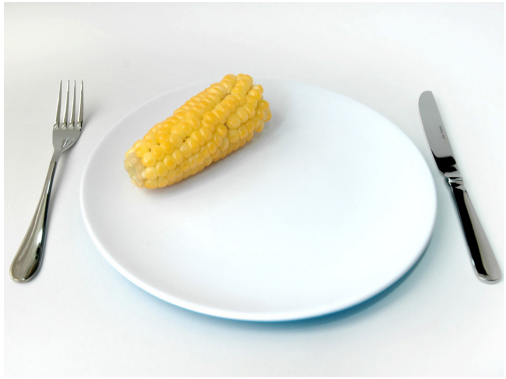
02.01.MOT.c

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

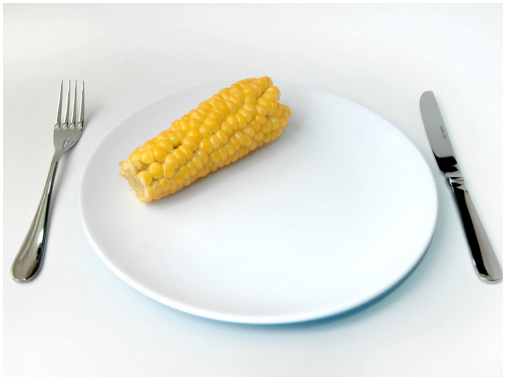
Cooked corn



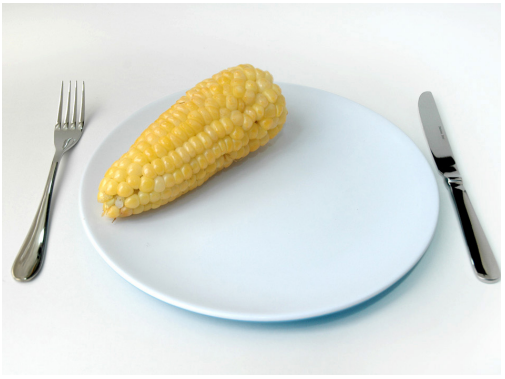
02.01.CHO.a



02.01.CHO.b



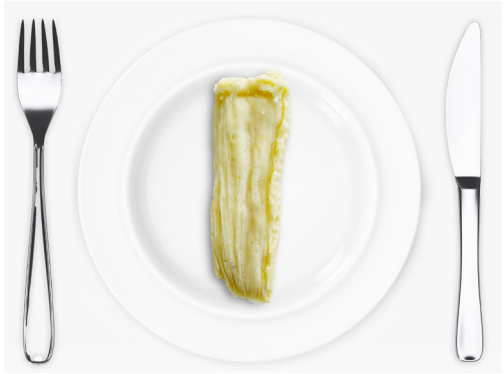
02.01.CHO.c



02.01.CHO.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

Home-made humita, quimbolito



02.01.HUM.a

02.01.QUI.a

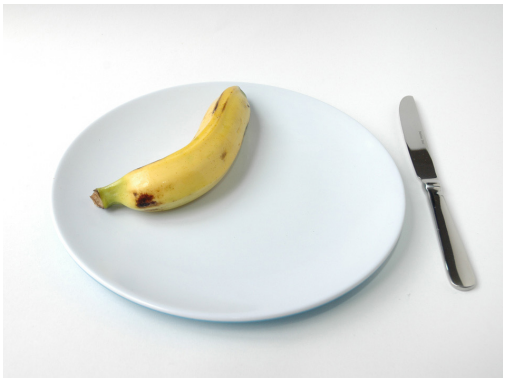
Photographs: Wilma Freire and Freepik.

b. Fruits

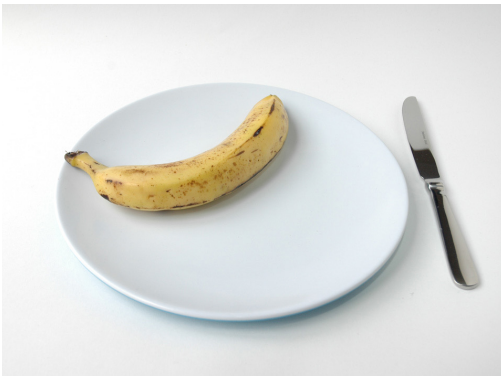
Banana

02.02.BAN.a

02.02.BAN.b



02.02.BAN.c



02.02.BAN.d

Strawberry

02.02.FRU.a

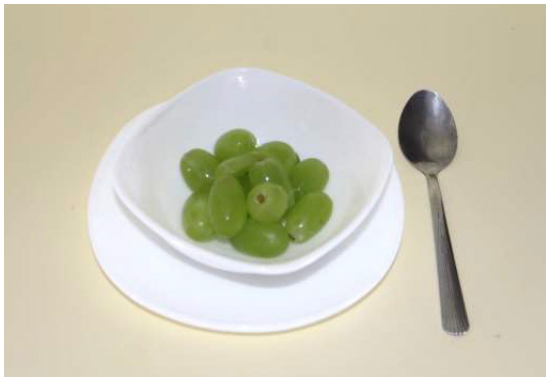
02.02.FRU.b

02.02.FRU.c

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Grapes

02.02.UVA.a

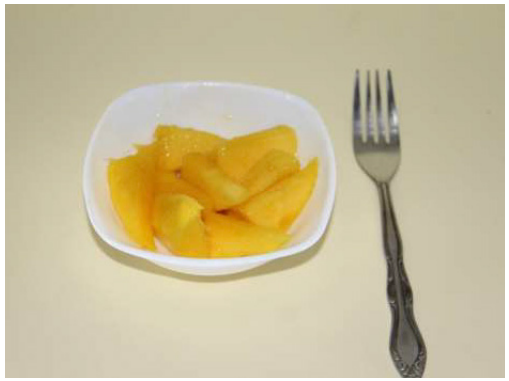


02.02.UVA.b

02.02.UVA.c

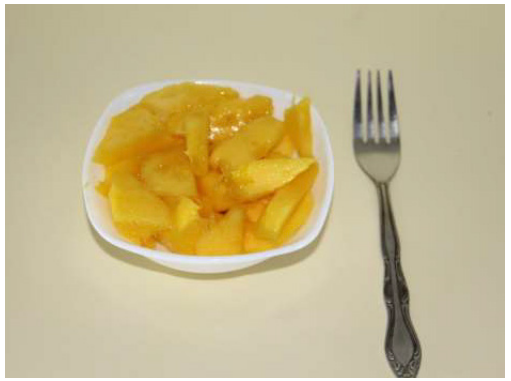
Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Mango

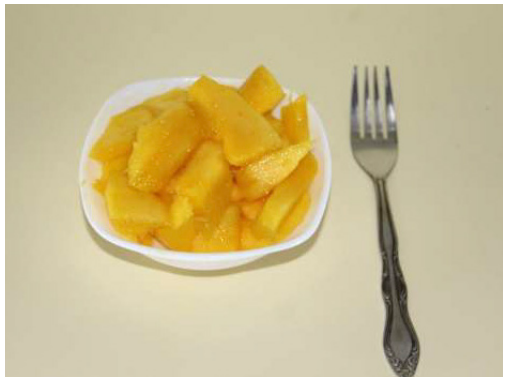


02.02.MAN.a

02.02.MAN.b



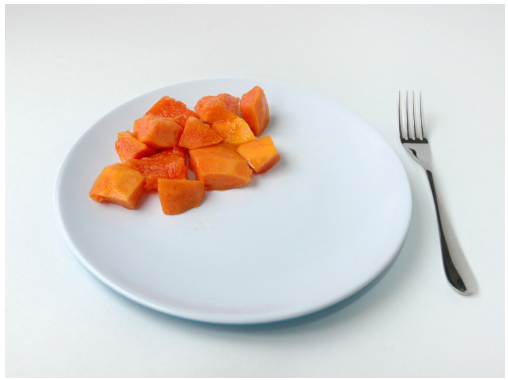
02.02.MAN.c



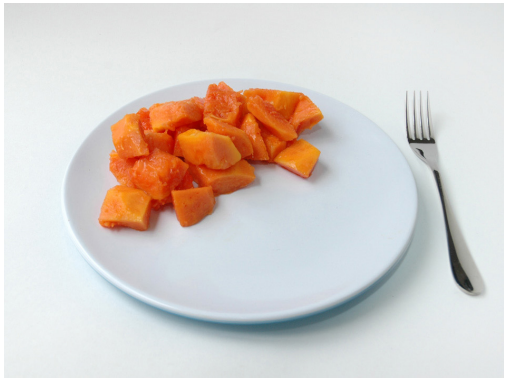
02.02.MAN.d

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

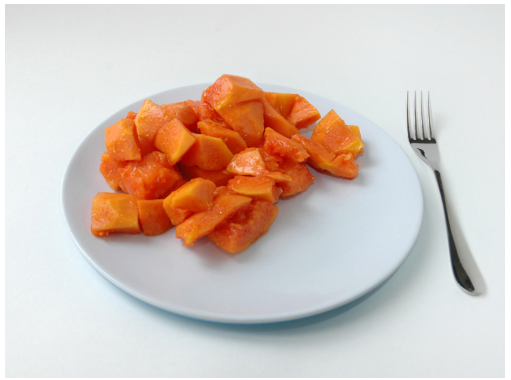
Sliced papaya



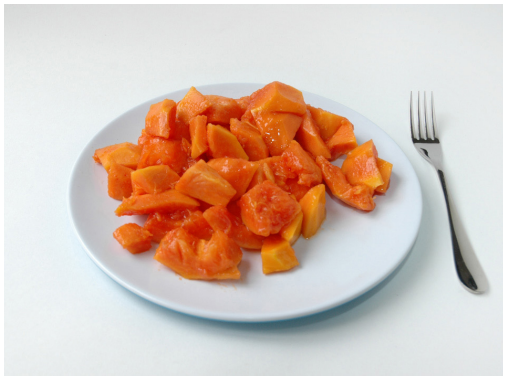
02.02.PAP.a



02.02.PAP.b



02.02.PAP.c



02.02.PAP.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

Fruit salad

02.02.EFR.a

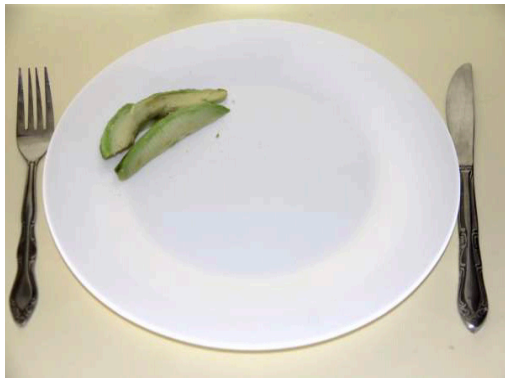
02.02.EFR.b

02.02.EFR.c

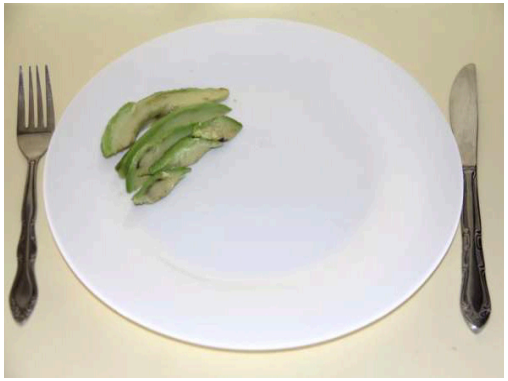
Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

c. Vegetables

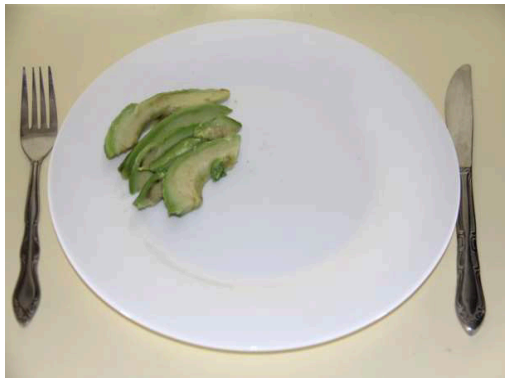
Avocado



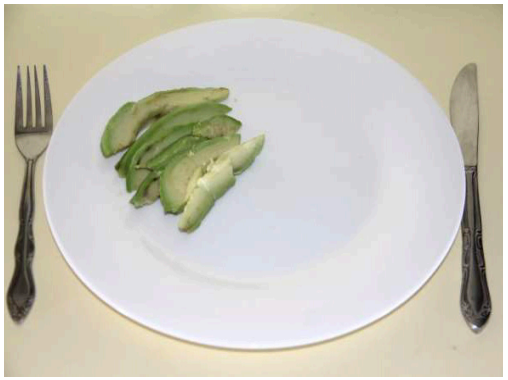
02.03.AGU.a



02.03.AGU.b



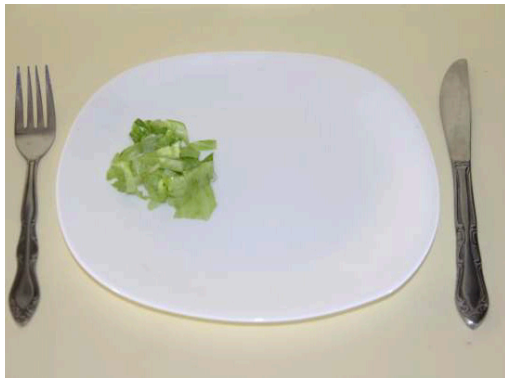
02.03.AGU.c



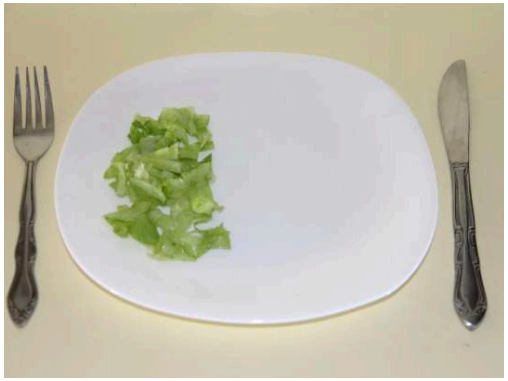
02.03.AGU.d

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

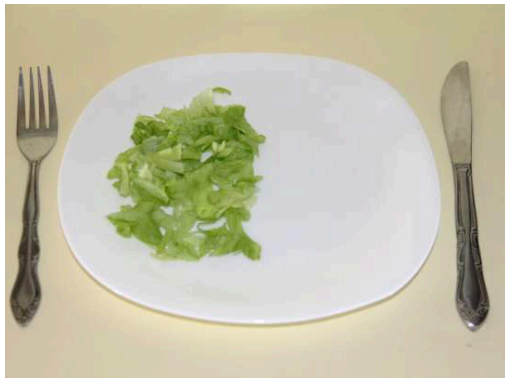
Lettuce



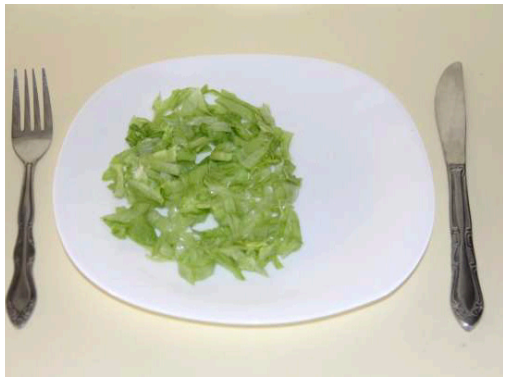
02.03.LEC.a



02.02.LEC.b



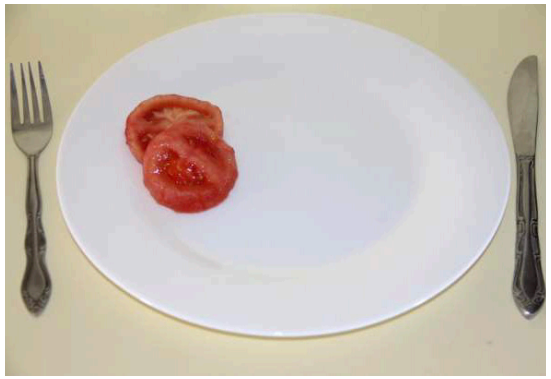
02.02.LEC.c



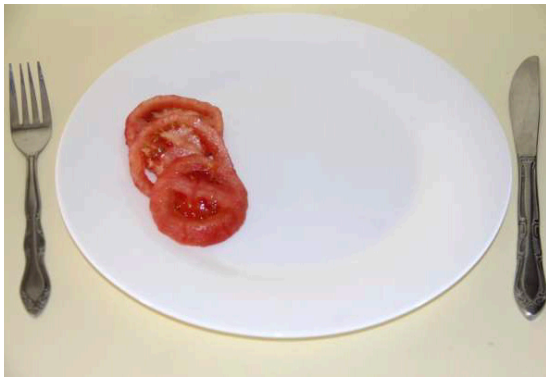
02.02.LEC.d

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

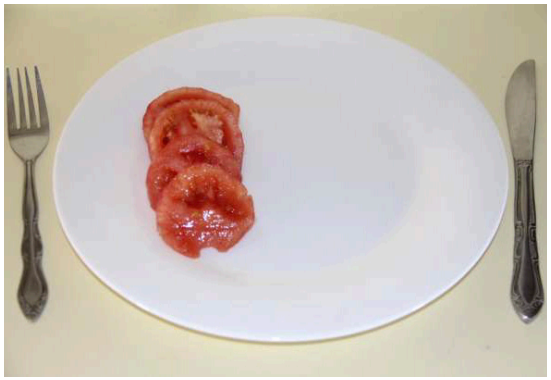
Tomato



02.03.TOM.a



02.03.TOM.b



02.03.TOM.c

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Red onion

02.03.CEB.a

02.03.CEB.b

02.03.CEB.c

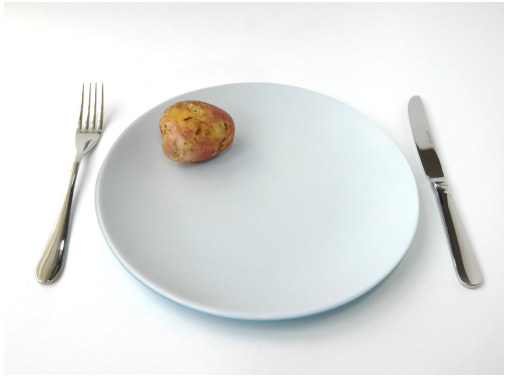
02.03.CEB.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

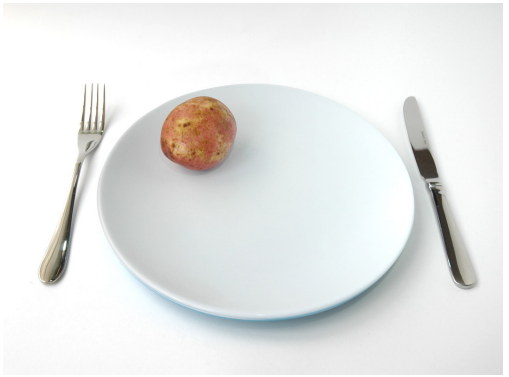
d. Tubers, roots and plantains

Whole cooked potato

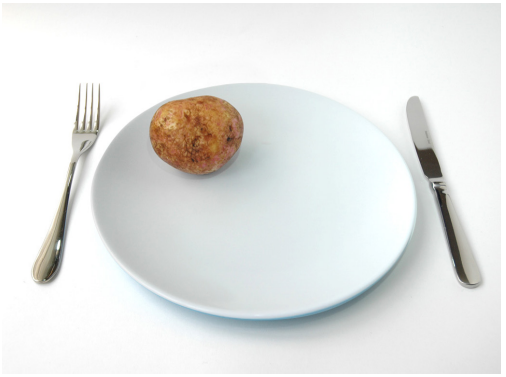
02.04.PAP.a



02.04.PAP.b



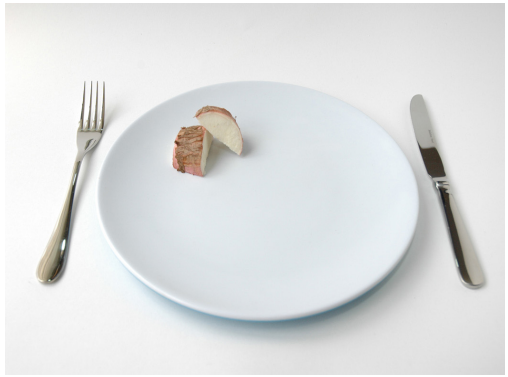
02.04.PAP.c



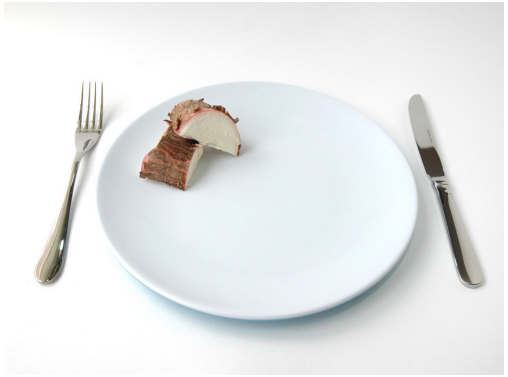
02.04.PAP.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

Cassava

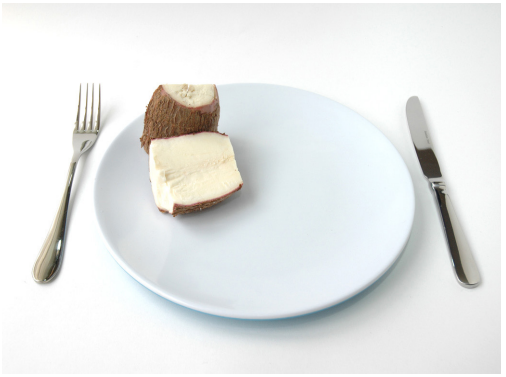


02.04.YUC.a



02.04.YUC.b

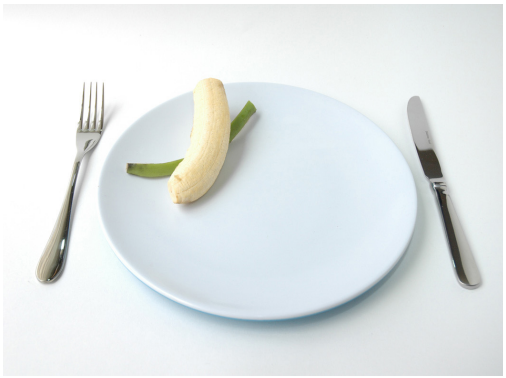
02.04.YUC.c



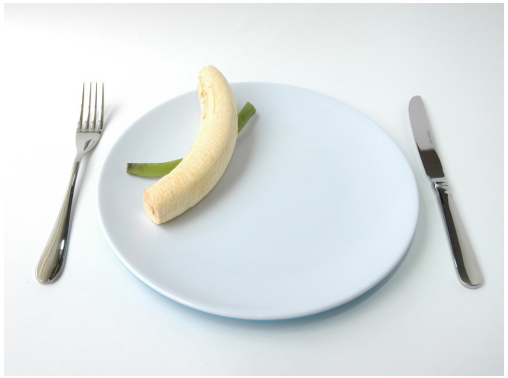
02.04.YUC.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

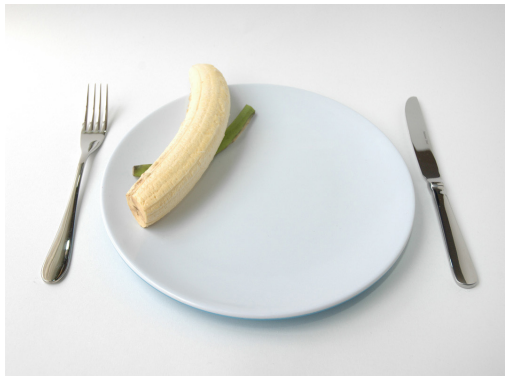
Plantain



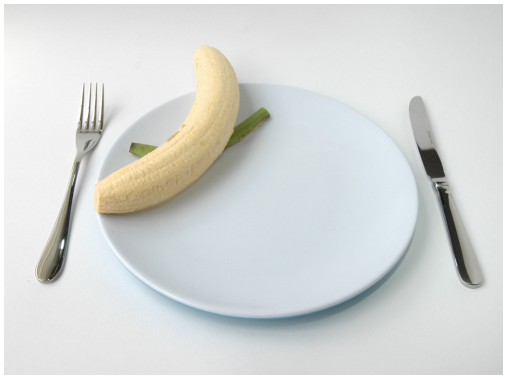
02.04.PLA.a



02.04.PLA.b



02.04.PLA.c



02.04.PLA.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.


3
Dishes prepared at home or at restaurants

a. Soups and second courses

Chicken consommé

03.01.CON.a

03.01.CON.b

03.01.CON.c

03.01.CON.d

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Creamy soup

03.01.CRE.a

03.01.CRE.b

03.01.CRE.c

03.01.CRE.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

Turnip soup

03.01.NAB.a

03.01.NAB.b

03.01.NAB.c

03.01.NAB.d

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

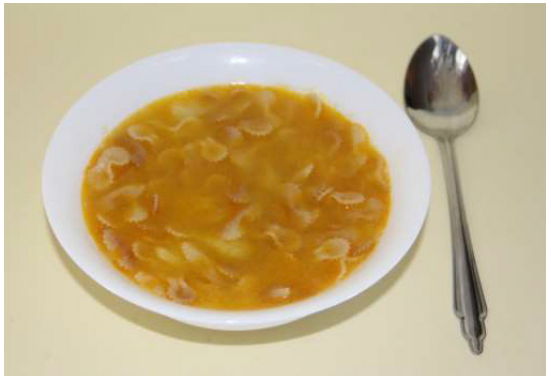
Noodle soup

03.01.FID.a

03.01.FID.b

03.01.FID.c

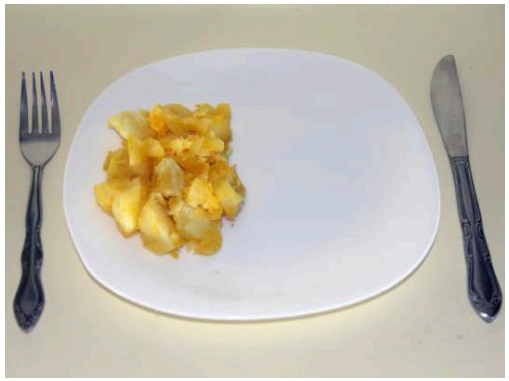
03.01.FID.d



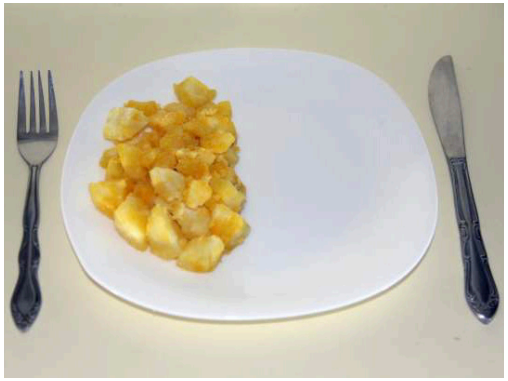
03.01.FID.e

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

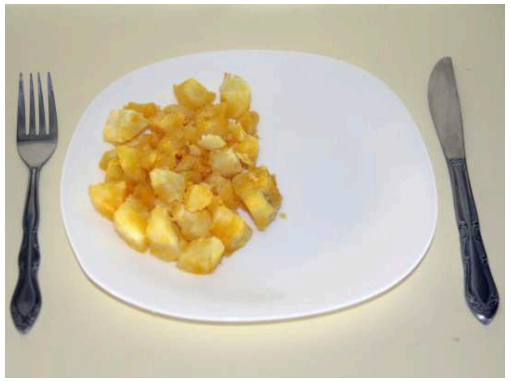
Cooked potato



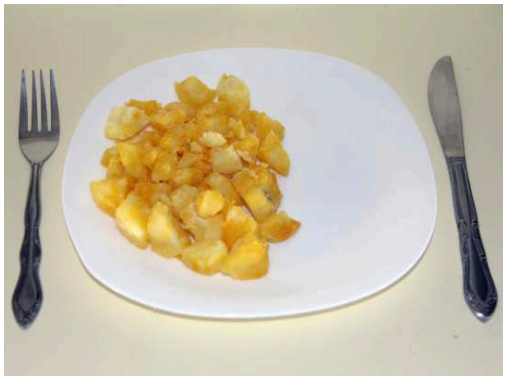
03.01.PAC.a



03.01.PAC.b



03.01.PAC.c



03.01.PAC.d

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Lentil menestra

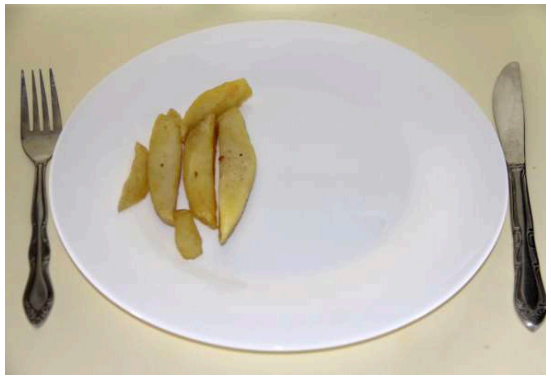
03.01.MEN.a

03.01.MEN.b

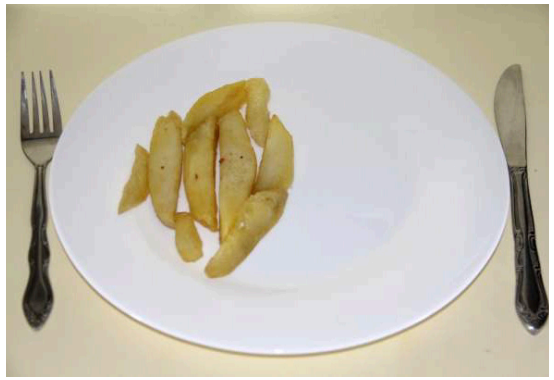
03.01.MEN.c

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

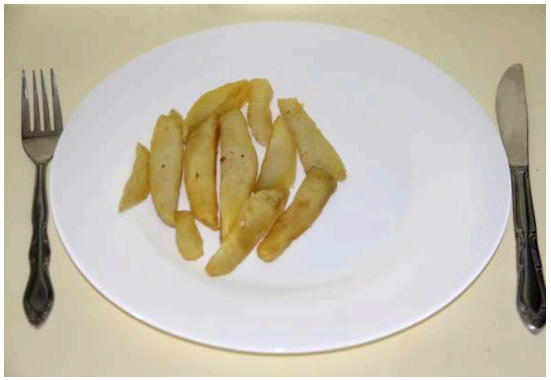
French fries



03.01.PAF.a



03.01.PAF.b



03.01.PAF.c

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Bean, corn and carrot salad


03.01.ENF.a

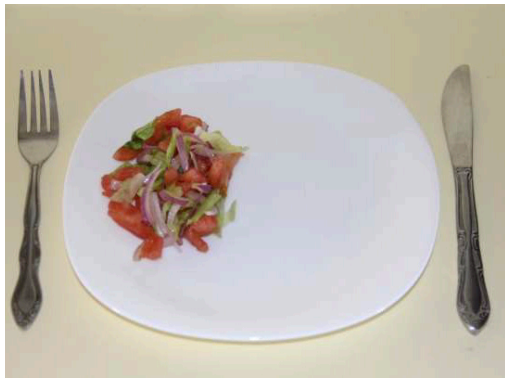

03.01.ENF.b


03.01.ENF.c


03.01.ENF.d

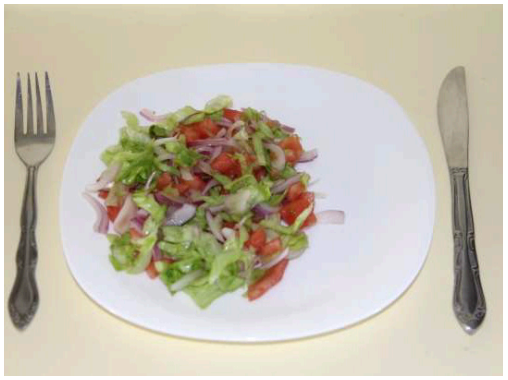
Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Lettuce, tomato and onion salad


03.01.ELT.a


03.01.ELT.b


03.01.ELT.c


03.01.ELT.d

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

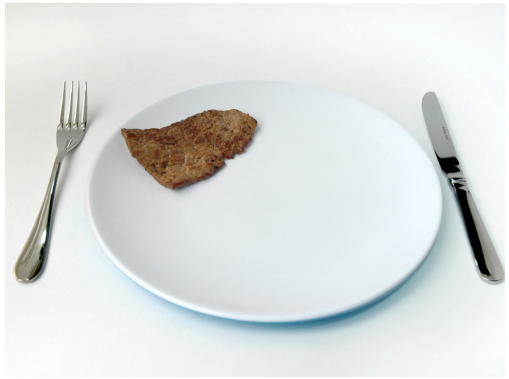
Bell pepper, onion and tomato salad

03.01.ENP.a

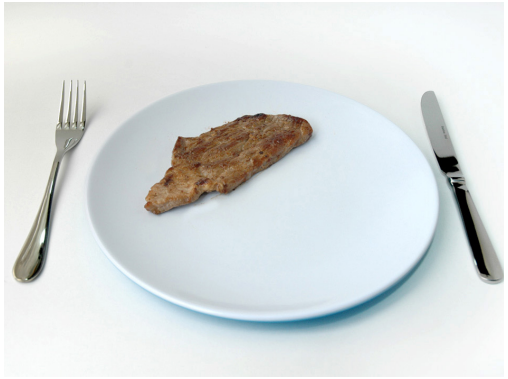
03.01.ENP.b

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

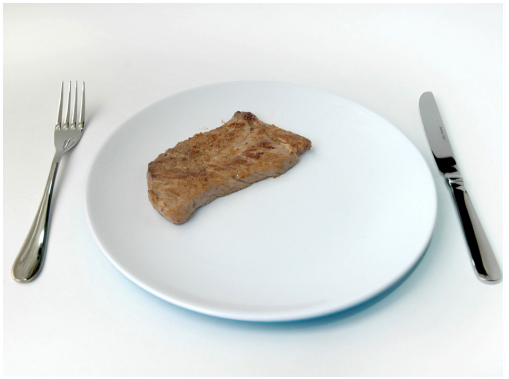
Grilled beef fillet



03.01.FIL.a



03.01.FIL.b



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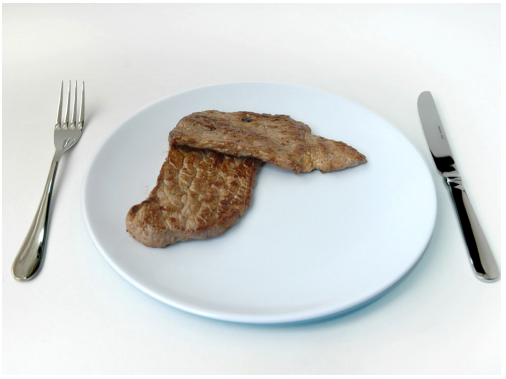
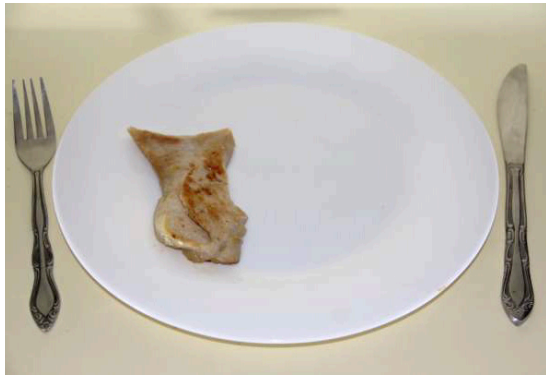


03.01.FIL.d

Aliméntate Ecuador. Photographic Atlas. Food Portions. Quito: Ministry of Social and Economic Inclusion, 2012.

Grilled chicken



03.01.POL.a

03.01.POL.b

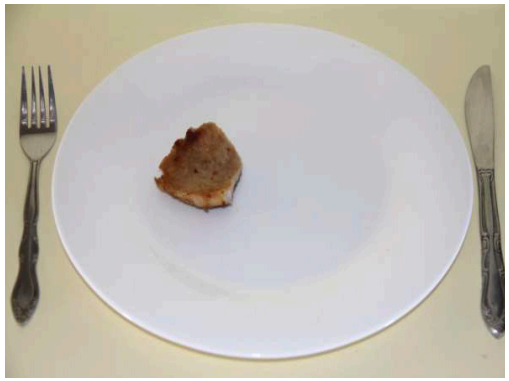
03.01.POL.c

03.01.POL.d

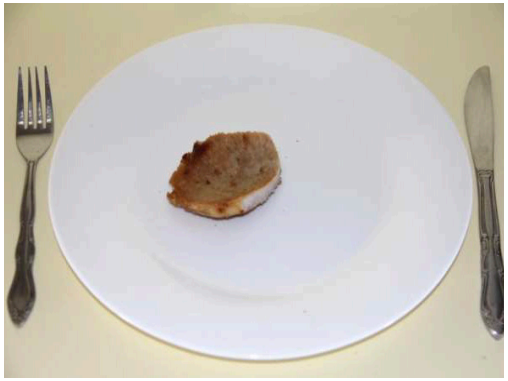
03.01.POL.e

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

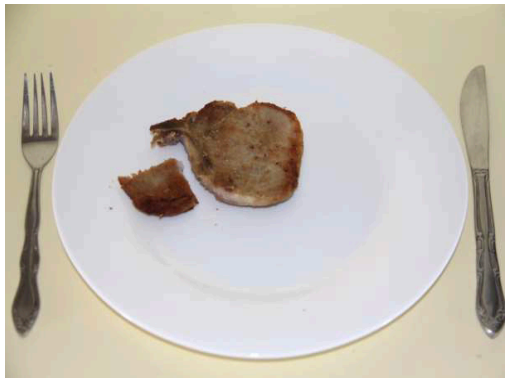
Pork chops



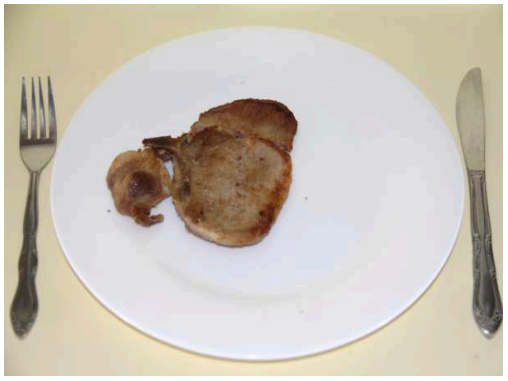
03.01.CHU.a



03.01.CHU.b



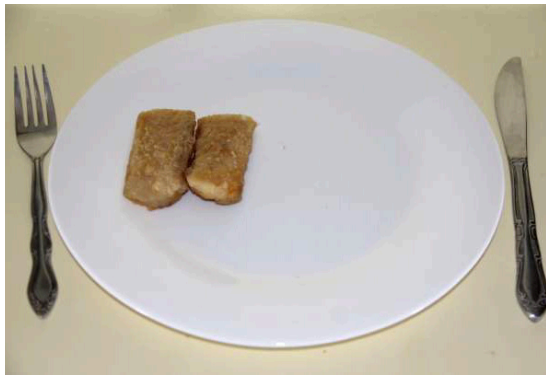
03.01.CHU.c



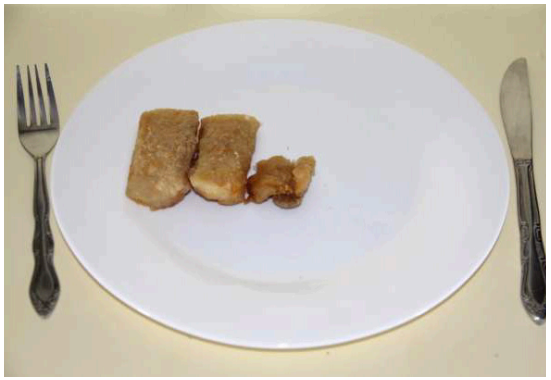
03.01.CHU.d

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Breaded sea bass



03.01.COR.a



03.01.COR.b

03.01.COR.c

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Guatita

03.01.GUA.a

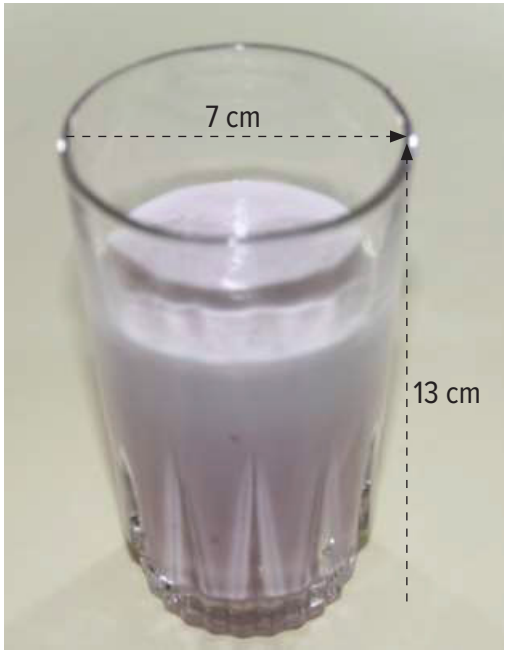
03.01.GUA.b

03.01.GUA.c

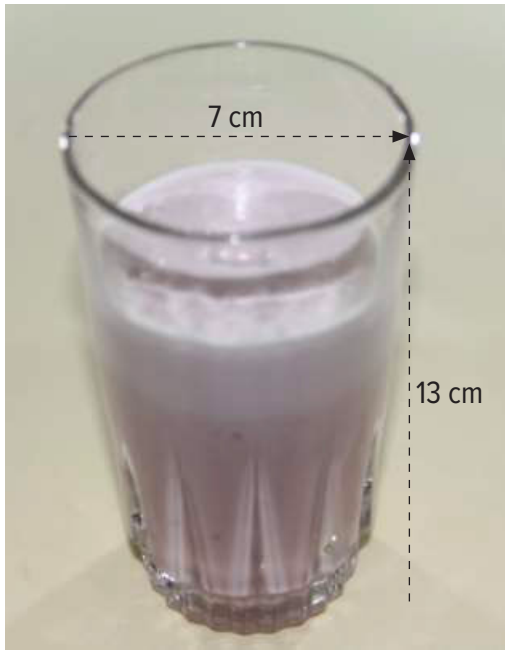
Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

b. Home-made beverages

Fruit milkshake



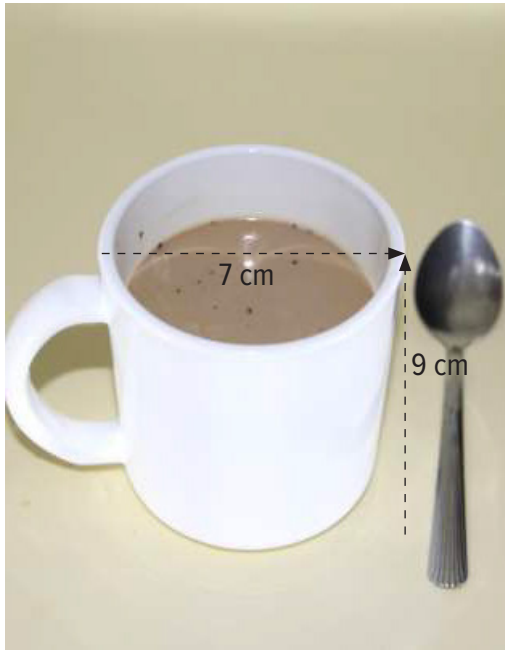
03.02.BAT.a



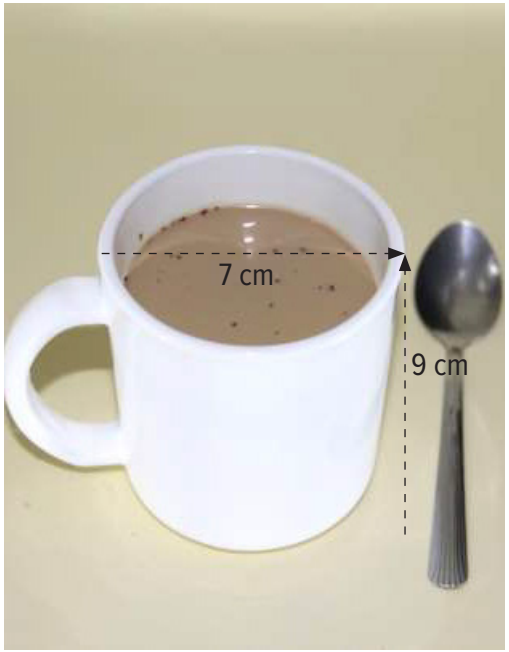
03.02.BAT.b

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Coffee with milk



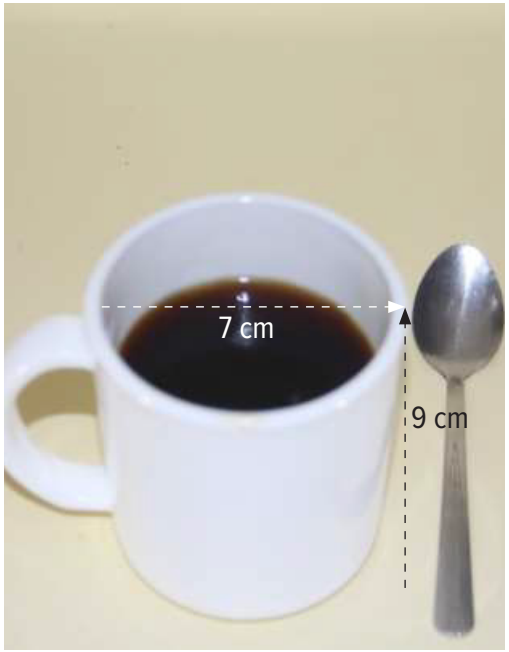
03.02.CCL.a



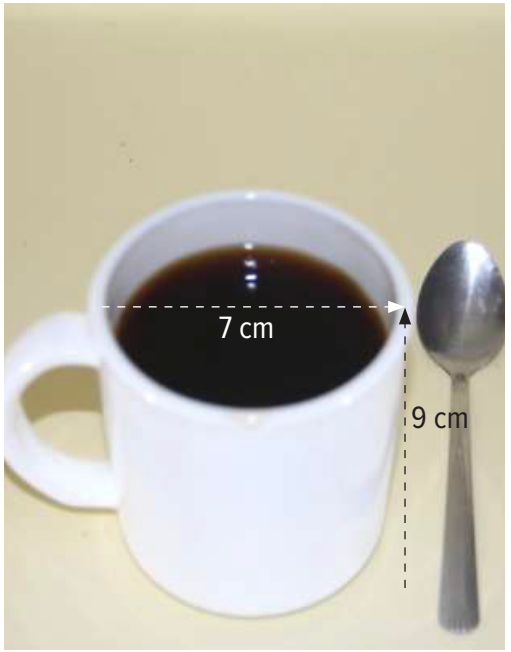
03.02.CCL.b

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Regular coffee



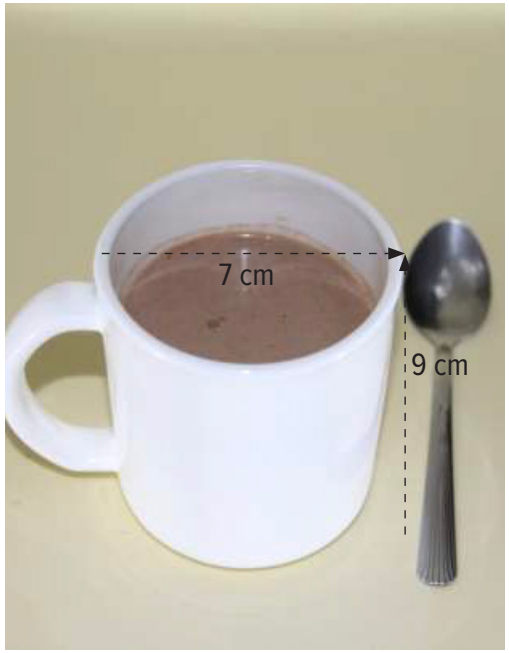
03.02.CCA.a



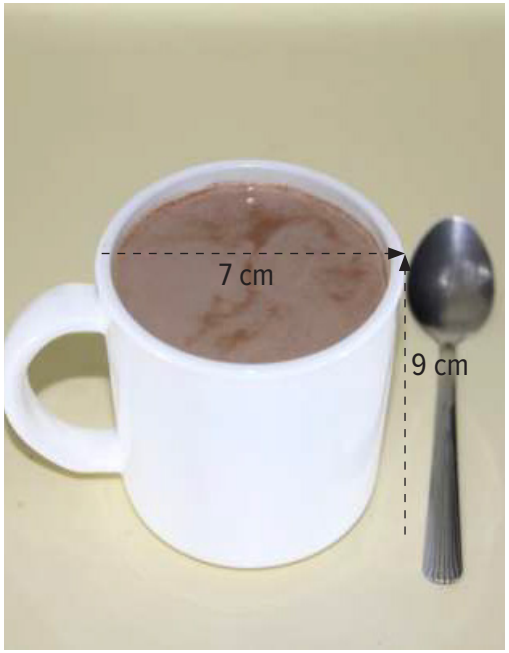
03.02.CCA.b

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901 .

Milk chocolate



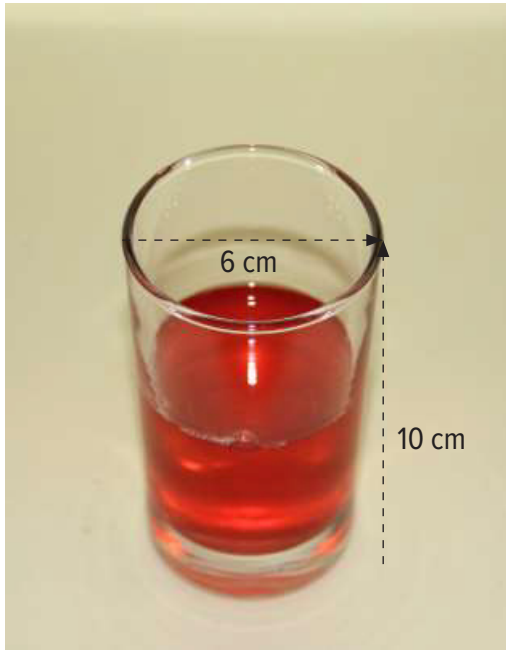
03.02.CCH.a



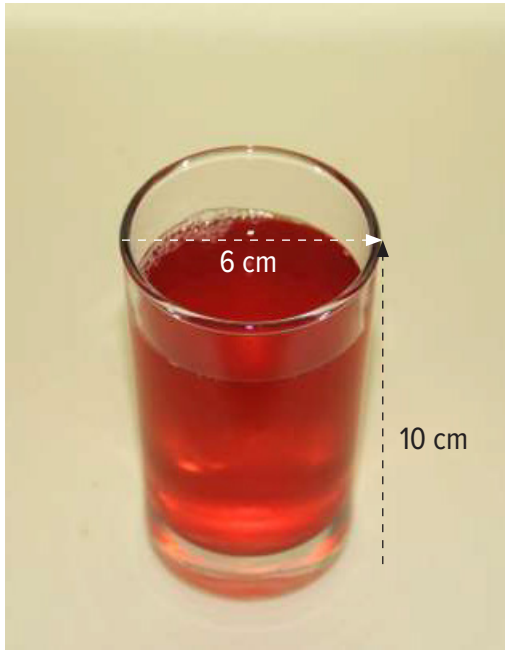
03.02.CCH.b

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

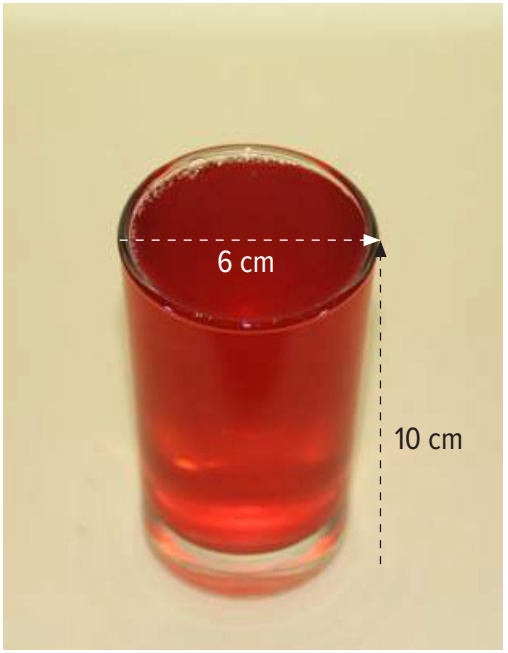
Horchata



03.02.HOR.a



03.02.HOR.b



03.02.HOR.c

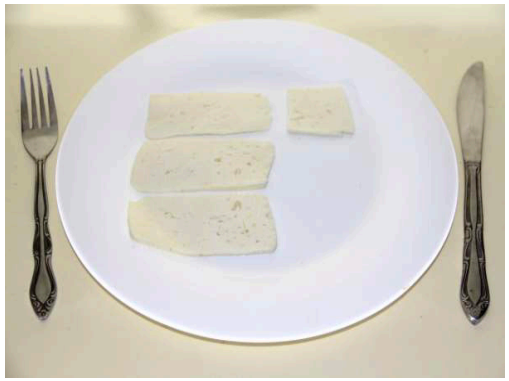
Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

c. Others

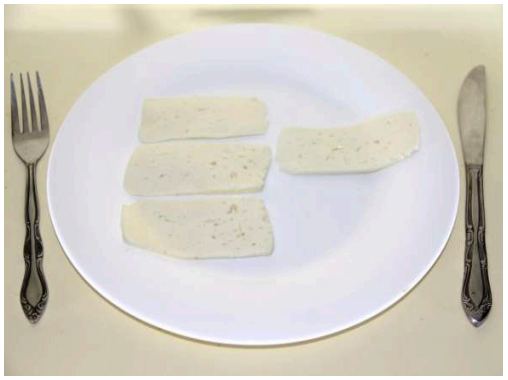
Fresh cheese

03.03.QUF.a

03.03.QUF.b



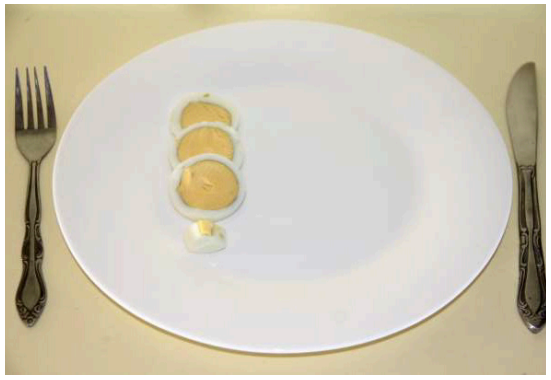
03.03.QUF.c



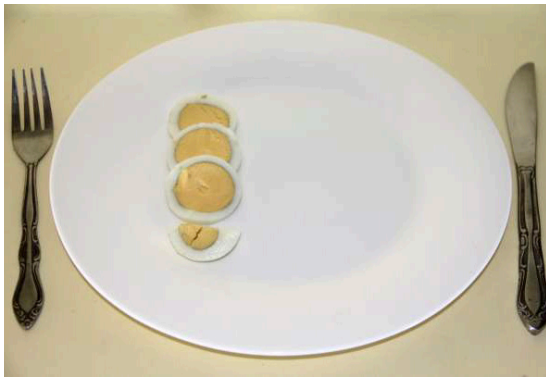
03.03.QUF.d

CChumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

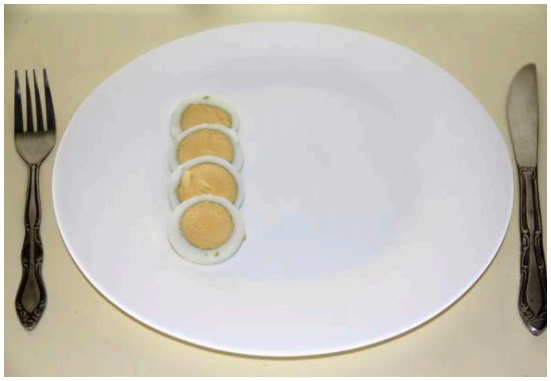
Eggs



03.03.HUE.a



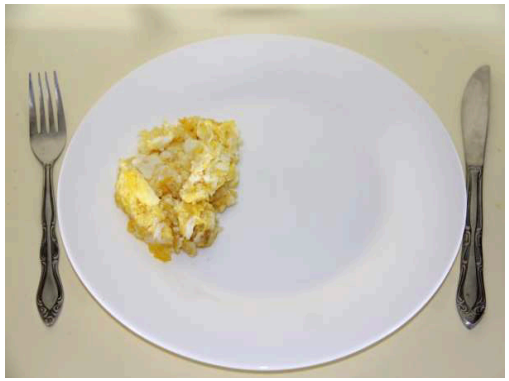
03.03.HUE.b



03.03.HUE.c

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Scrambled eggs



03.03.HUR.a

03.03.HUR.b

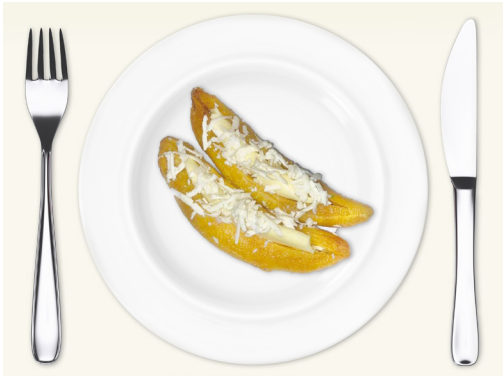
03.03.HUR.c

03.03.HUR.d

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

d. Desserts

Plantain with cheese, rice pudding, figs with cheese, home-made ice cream



03.04.PLA.a

03.04.HIG.a

03.04.ARL.a

03.04.HEL.a

Photographs: Wilma Freire Andrea Chávez and Freepik.

4

Ultra-processed products and beverages

Industrial bread (1 slice)

04.01.PIN.a

04.01.PIN.b

Photographs: Sebastián Argüello, New Era Agency, 2022.

Industrial humitas, quimbolitos

04.02.HUI.a

04.02.QUI.a

Photographs: Wilma Freire and Freepik.

Ultra-processed cereals

04.03.CEM.a

04.03.CEM.b

04.03.CEM.c

Photographs: Sebastián Argüello, New Era Agency, 2022.

Ultra-processed menestra (fast-food restaurant)

04.04.MEP.a

04.04.MEP.b

Photographs: Andrea Chávez and Freepik.

Ready-to-eat ultra-processed pizza

04.05.PIZ.a

Photograph: Freepik.

Canned tuna

04.06.ATU.a

Photographs: Sebastián Argüello, New Era Agency, 2022.

Ultra-processed croquettes or nuggets

04.07.CRO.a

Photographs: Sebastián Argüello, New Era Agency, 2022.

Sodas, soft drinks, regular or light. Bottled or Tetra Pak fruit-flavored beverages

04.08.BEP.a

04.08.BEP.b

04.08.BEP.c

Photograph: Freepik.

Bottled, Tetra Pak or prepared from powdered mix tea or coffee

04.09.TEC.a

04.09.TEC.b

Photograph: Freepik.

Bottled chocolate and bottled flavored milk

04.10.CHE.a

04.10.CHE.b

Photographs: Sebastián Argüello, New Era Agency, 2022.

Flavored yogurt, including liquid yogurts

04.11.YOG.a

Photograph: Freepik.


5
Snacks

Candies

05.01.CAR.a

Photographs: Sebastián Argüello, New Era Agency, 2022.

Packaged French fries, potato chips, chifles

05.02.PFR.a

05.02.PFR.b

Photographs: Sebastián Argüello, New Era Agency, 2022.

Packaged donuts

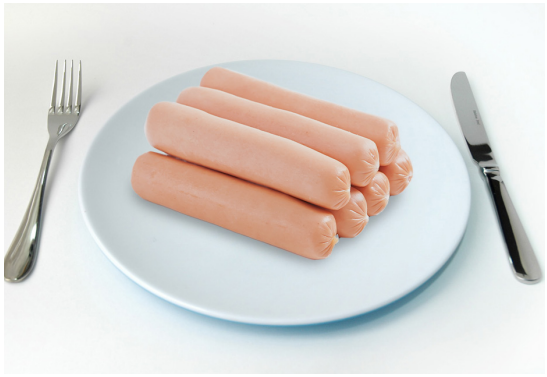
05.03.DON.a

05.03.DON.b

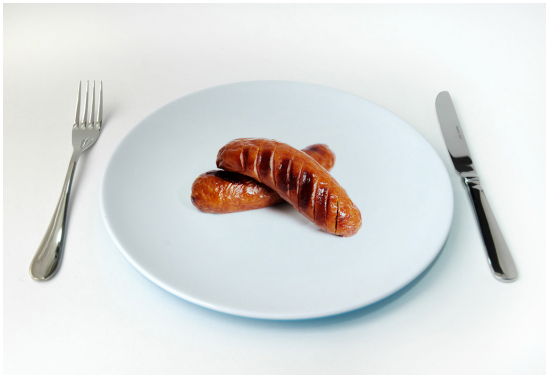
05.03.DON.c

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

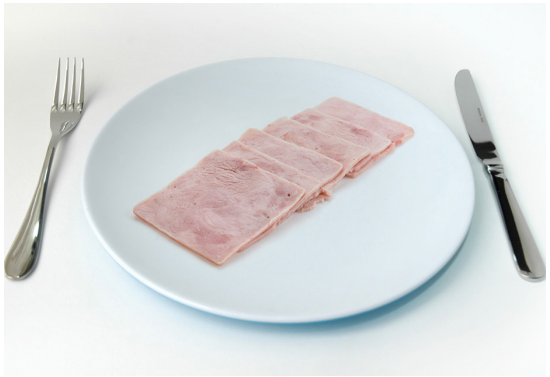
Charcuterie: sausages, chorizos, mortadella



05.04.EMB.a



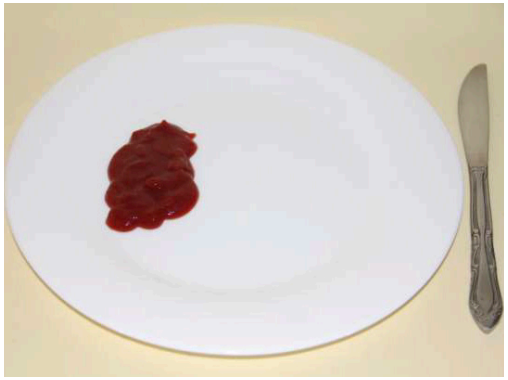
05.04.EMB.b



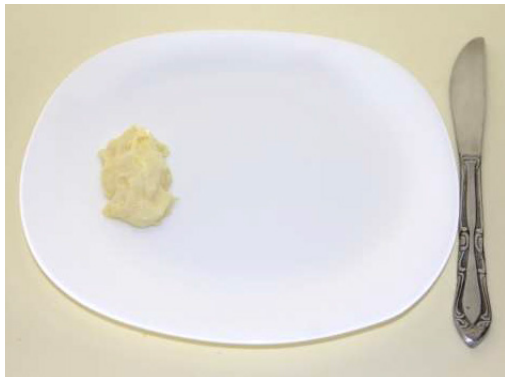
05.04.EMB.c

Photograph: Freepik.

Ketchup, mayonnaise



05.05.MAY.a



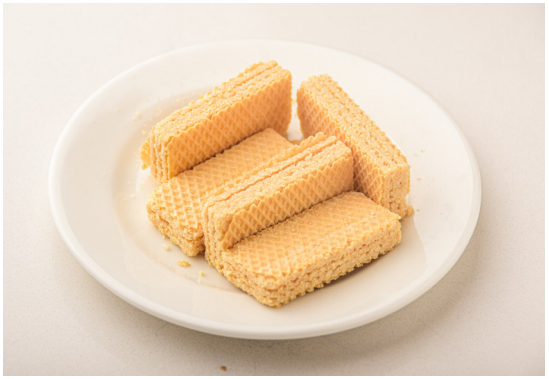
05.05.MAY.b

Chumbi C, Vásquez S. Catálogo fotográfico como herramienta para la estimación de la ingesta alimentaria en niños y adultos. Undergraduate thesis, Universidad de Cuenca. [Internet]. 2012 [cited on June 20, 2023]. Available at: http://dspace.ucuenca.edu.ec/handle/123456789/29901.

Muffin-type industrial cake or filled cake

05.06.PAS.a

05.06.PAS.b



05.06.PAS.c

Photographs: Sebastián Argüello, New Era Agency, 2022.

Polito or similar ice cream

05.07.HEP.a

05.07.HEP.b

Photographs: Sebastián Argüello, New Era Agency, 2022.


6
Codes and weights
ON/OFF
TARA
g/oz
207g

Pages	Foods and home measurements groups	Food	Code	Weight	Code	Weight	Code	Weight	Code	Weight	Code	Weight	Code	Weight
43	Cooking ingredients	Sugar	01.01.AZU.a	4 g	01.01.AZU.b	8 g	01.01.AZU.c	10 g	01.01.AZU.d	16 g				
44	Cooking ingredients	Oil	01.02.ACE.a	0 g	01.02.ACE.b	3 g	01.02.ACE.c	7 g	01.02.ACE.d	46 g				
45	Cooking ingredients	Lard	01.03.MAN.a	10 g	01.03.MAN.b	15 g	01.03.MAN.c	20 g	01.03.MAN.d	40 g				
46	Cooking ingredients	Salt	01.04.SAL.a	6 g	01.04.SAL.b	10 g	01.04.SAL.c	14 g	01.04.SAL.d	22 g				
48	Standardized food portions	Cooked white rice	02.01.ARR.a	94 g	02.01.ARR.b	141 g	02.01.ARR.c	189 g	02.01.ARR.d	237 g	02.01.ARR.e	332 g	02.01.ARR.f	380 g
49	Standardized food portions	Cooked noodles	02.01.FID.a	73 g	02.01.FID.b	175 g	02.01.FID.c	248 g	02.01.FID.d	331 g				
50	Standardized food portions	Cooked mote	02.01.MOT.a	77 g	02.01.MOT.b	84 g	02.01.MOT.c	92 g						
51	Standardized food portions	Cooked corn	02.01.CHO.a	132 g	02.01.CHO.b	159 g	02.01.CHO.c	180 g	02.01.CHO.d	281 g				
52	Standardized food portions	Humita	02.01.HUM.a	110 g										
52	Standardized food portions	Quimbolito	02.01.QUIM.a	130 g										
53	Standardized food portions	Banana	02.02.BAN.a	97 g	02.02.BAN.b	109 g	02.02.BAN.c	149 g	02.02.BAN.d	170 g				
54	Standardized food portions	Strawberry	02.02.FRU.a	56 g	02.02.FRU.b	57 g	02.02.FRU.c	59 g						
55	Standardized food portions	Grapes	02.02.UVA.a	52 g	02.02.UVA.b	57 g	02.02.UVA.c	61 g						
56	Standardized food portions	Mango	02.02.MAN.a	86 g	02.02.MAN.b	105 g	02.02.MAN.c	142 g	02.02.MAN.d	180 g				
57	Standardized food portions	Sliced papaya	02.02.PAP.a	144 g	02.02.PAP.b	275 g	02.02.PAP.c	451 g	02.02.PAP.d	564 g				
58	Standardized food portions	Fruit salad	02.02.FRU.a	113 g	02.02.FRU.b	150 g	02.02.FRU.c	187 g						
59	Standardized food portions	Avocado	02.03.AGU.a	24 g	02.03.AGU.b	40 g	02.03.AGU.c	48 g	02.03.AGU.d	56 g				
60	Standardized food portions	Lettuce	02.03.LEC.a	5 g	02.03.LEC.b	9 g	02.03.LEC.c	19 g	02.03.LEC.d	21 g				
61	Standardized food portions	Tomato	02.03.TOM.a	35 g	02.03.TOM.b	46 g	02.03.TOM.c	57 g						
62	Standardized food portions	Red onion	02.03.CEB.a	42 g	02.03.CEB.b	105 g	02.03.CEB.c	141 g	02.03.CEB.d	183 g				

Pages	Foods and home measurements groups	Food	Code	Weight	Code	Weight	Code	Weight	Code	Weight	Code	Weight	Code	Weight
63	Standardized food portions	Whole cooked potato	02.04.PAP.a	39 g	02.04.PAP.b	79 g	02.04.PAP.c	119 g	02.04.PAP.d	146 g				
64	Standardized food portions	Cassava	02.04.YUC.a	37 g	02.04.YUC.b	46 g	02.04.YUC.c	65 g	02.04.YUC.d	178 g				
65	Standardized food portions	Plantain	02.04.PLA.a	134 g	02.04.PLA.b	170 g	02.04.PLA.c	304 g	02.04.PLA.d	430 g				
67	Dishes prepared at home or at restaurants	Chicken consommé	03.01.CON.a	197 g	03.01.CON.b	241 g	03.01.CON.c	286 g	03.01.CON.d	330 g				
68	Dishes prepared at home or at restaurants	Creamy soup	03.01.CRE.a	225 cc	03.01.CRE.b	338 cc	03.01.CRE.c	450 cc	03.01.CRE.d	563 cc				
69	Dishes prepared at home or at restaurants	Turnip soup	03.01.NAB.a	316 g	03.01.NAB.b	347 g	03.01.NAB.c	408 g	03.01.NAB.d	439 g				
70	Dishes prepared at home or at restaurants	Noodles soup	03.01.FID.a	280 g	03.01.FID.b	295 g	03.01.FID.c	310 g	03.01.FID.d	339 g	03.01.FID.e	354 g	03.01.FID.f	368 g
71	Dishes prepared at home or at restaurants	Boiled potato	03.01.PAC.a	86 g	03.01.PAC.b	97 g	03.01.PAC.c	109 g	03.01.PAC.d	120 g				
72	Dishes prepared at home or at restaurants	Lentils menestra	03.01.MEN.a	73 g	03.01.MEN.b	75 g	03.01.MEN.c	78 g						
73	Dishes prepared at home or at restaurants	French fries	03.01.PAF.a	54 g	03.01.PAF.b	66 g	03.01.PAF.c	79 g						
74	Dishes prepared at home or at restaurants	Bean, corn and carrot salad	03.01.ENF.a	44 g	03.01.ENF.b	66 g	03.01.ENF.c	89 g	03.01.ENF.d	109 g				
75	Dishes prepared at home or at restaurants	Lettuce, tomato and onion salad	03.01.ELT.a	36 g	03.01.ELT.b	56 g	03.01.ELT.c	71 g	03.01.ELT.d	89 g				
76	Dishes prepared at home or at restaurants	Bell pepper, onion and tomato salad	03.01.ENP.a	83 g	03.01.ENP.b	94 g								
77	Dishes prepared at home or at restaurants	Grilled beef fillet	03.01.FIL.a	23 g	03.01.FIL.b	46 g	03.01.FIL.c	81 g	03.01.FIL.d	98 g				
78	Dishes prepared at home or at restaurants	Grilled chicken	03.01.POL.a	44 g	03.01.POL.b	47 g	03.01.POL.c	50 g	03.01.POL.d	56 g	03.01.POL.e	59 g	03.01.POL.f	62 g
79	Dishes prepared at home or at restaurants	Pork chops	03.01.CHU.a	24 g	03.01.CHU.b	33 g	03.01.CHU.c	59 g	03.01.CHU.d	77 g				
80	Dishes prepared at home or at restaurants	Breaded sea bass	03.01.COR.a	66 g	03.01.COR.b	68 g	03.01.COR.c	71 g						
81	Dishes prepared at home or at restaurants	Guatita	03.01.GUA.a	105 g	03.01.GUA.b	111 g	03.01.GUA.c	118 g						
82	Dishes prepared at home or at restaurants	Fruit milkshake	03.02.BAT.a	226 ml	03.02.BAT.b	246 ml								
83	Dishes prepared at home or at restaurants	Coffee with milk	03.02.CCL.a	230 ml	03.02.CCL.b	257 ml								

Pages	Foods and home measurements groups	Food	Code	Weight	Code	Weight	Code	Weight	Code	Weight	Code	Weight	Code	Weight
84	Dishes prepared at home or at restaurants	Regular coffee	03.02.CCA.a	227 ml	03.02.CCA.b	273 ml								
85	Dishes prepared at home or at restaurants	Milk chocolate	03.02.CCH.a	240 ml	03.02.CCH.b	365 ml								
86	Dishes prepared at home or at restaurants	Horchata	03.02.HOR.a	98 ml	03.02.HOR.b	181 ml	03.02.HOR.c	265 ml						
87	Dishes prepared at home or at restaurants	Fresh cheese	03.03.QUF.a	20 g	03.03.QUF.b	24 g	03.03.QUF.c	36 g	03.03.QUF.d	40 g				
88	Dishes prepared at home or at restaurants	Eggs	03.03.HUE.a	26 g	03.03.HUE.b	28 g	03.03.HUE.c	30 g						
89	Dishes prepared at home or at restaurants	Scrambled eggs	03.03.HUR.a	71 g	03.03.HUR.b	89 g	03.03.HUR.c	98 g	03.03.HUR.d	115 g				
90	Dishes prepared at home or at restaurants	Plantain with cheese	03.04.PLA.a	140 g										
90	Dishes prepared at home or at restaurants	Rice pudding	03.04.ARL.a	250 g										
90	Dishes prepared at home or at restaurants	Figs with cheese	03.04.HIG.a	120 g										
90	Dishes prepared at home or at restaurants	Home-made ice cream	03.04.HEL.a	80 g										
92	Ultra-processed products and beverages	Industrial bread (1 slice)	04.01.PIN.a	15 g	04.01.PIN.b	15 g								
93	Ultra-processed products and beverages	Industrial humita	04.01.HUI.a	140 g										
93	Ultra-processed products and beverages	Industrial quimbolito	04.02.QUI.a	150 g										
94	Ultra-processed products and beverages	Packaged cereals (3/4 cups)	04.03.CEM.a	30 g	04.03.CEM.b	30 g	04.03.CEM.c	30 g						
95	Ultra-processed products and beverages	Read-to-eat menestras	04.04.MEP.a	240 g	04.04.MEP.b	240 g								
96	Ultra-processed products and beverages	Ready-to-eat pizza (1 slice)	04.05.PIZ.a	47 g										
97	Ultra-processed products and beverages	Canned tuna (100 g portion)	04.06.ATU.a	100 g										
98	Ultra-processed products and beverages	Ultra-processed croquettes or nuggets	04.07.CRO.a	20 g										
99	Ultra-processed products and beverages	Sodas, soft drinks, regular or light	04.08.BEP.a	500 ml	04.08.BEP.b	500 ml	04.08.BEP.c	500 ml						
100	Ultra-processed products and beverages	Bottled tea or coffee	04.09.TEC.a	500 ml	04.09.TEC.b	500 ml								

Pages	Foods and home measurements groups	Food	Code	Weight	Code	Weight	Code	Weight	Code	Weight	Code	Weight	Code	Weight
101	Ultra-processed products and beverages	Bottled or Tetra Pak chocolate (1 cup)	04.10.CHE.a	200 ml	04.10.CHE.b	200 ml								
102	Ultra-processed products and beverages	Flavored yogurt	04.11.YOG.a	190 g										
104	Snacks	Candies	05.01.CAR.a	20 g										
105	Snacks	French fries, potato chips, chifles	05.02.PFR.a	150 g	05.02.PFR.a	150 g								
106	Snacks	Donuts	05.04.DON.a	75 g	05.04.DON.b	41 g	05.04.DON.c	54 g						
107	Snacks	Charcuterie (1 unit)	05.05.EMB.a	50 g	05.05.EMB.b	55 g	05.05.EMB.c	17 g						
108	Snacks	Mayonnaise, ketchup or mustard	05.06.MAY.a	13 g	05.06.MAY.b	13 g								
109	Snacks	Muffin-type industrial cake (1 unit)	05.07.PAS.a	35 g	05.07.PAS.b	50 g	05.07.PAS.c	40 g						
110	Snacks	Polito or similar ice cream	05.08.HEP.a	135 ml	05.08.HEP.b	135 ml								

ANNEX B

NOVA 27 Categories Tracker

				Notes: brand/identification
No	**See this list of beverages. Tick off all the ones you drank yesterday.**			
1	Tick off the foods consumed yesterday	Sodas, soft drinks, regular or light		
2		Fruit-flavored or prepared from powdered mix beverages or jellos		
3		Bottled or Tetra Pak fruit-flavored beverages		
4		Bottled, Tetra Pak or prepared from powdered mix chocolate beverage		
5		Bottled, Tetra Pak or prepared from powdered mix tea or coffee beverage		
6		Any type of flavored yogurt (including liquid yogurts)		
7		Flavored milk		
8		Powdered milk		
0		Did not drink yesterday any of the beverages on this list		
	See this list of beverages. Tick off all the ones you drank yesterday.			
1	Tick off the beverages consumed yesterday	Sausage, chorizo, salchipapa, hamburger or nuggets		
2		Seasoned and pre-cooked meats		
3		Ham, salami or mortadella		
4		Canned menestra		
5		Sliced bread or industrial bread		
6		Margarine		
7		Mayonnaise, ketchup or mustard		
8		Bottled salad dressing		
9		Frozen or fast-food restaurant French fries		
10		Humitas, quimbolitos, cassava bread, muchines, plantain empanadas, pre-cooked or frozen bonitísimas		
11		Frozen or fast-food restaurant pizza		
12		Instant noodles or spaghettis or instant powdered soups		
0		Did not eat yesterday any of the foods on this list		
	See this list of snacks. Tick off all the ones you consumed yesterday.			
1	Marcar todos los alimentos que consumió el día de ayer	Bagged chips or crackers or any other type of branded, salted and bagged snack		
2		Sweet cookies with or without filling		
3		Cereal bars		
4		Industrial cake (not homemade nor muffin, brand-name cake or powdered pancake or cake mixes)		
5		Polito or similar (non-homemade nor artisanal ice cream)		
6		Chocholate bar or bonbon, candies, chewing-gum		
7		Packaged breakfast cereals		
0		Did not eat yesterday any of the foods on this list		

24-hour reminder multi-step method

Consider the surveyors attitude at the beginning and during the interview.

Tell everything you ate and drank yesterday; from the time you got up until the time you went to bed.	**Type of cooking**	**Meal time**	**Place the meal was consumed**	**Unit according to the Atlas**	**Amount consumed**	**What type of food?**	**Product brand**	**Categorize acoording to NOVA following the survey.**
(Allow the interviewee to talk about all foods and beverages consumed. Do not interrupt. After they finish, ask them to define the type of cooking used for each food. Example: roasted, fried, cooked)	roasted, fired, cooked,	1. ad 2. d 3. mm 4. a 5. mt 6. m 7. dm	1. at home 2. office 3. neighborhood store 4. restaurant 5. street vendors 6. fast-food restaurant	grams, milliliters or Atlas code	Portions	-Light -Not light -Does not apply		1. minimally processed 2. cooking ingredients 3. processed 4. ultra-processed
Multi-steps:								
Paso 1	Paso 2	Paso 3.1	Paso 3.2	Paso 4.1	Paso 4.2	Paso 5.2	Paso 5.3	Paso 5.4

ANNEX C

Informed consent

Universidad San Francisco de Quito USFQ

2021-027M
VE4.0, June 16, 2021

Digital Informed Consent

A. Research data	
Research title:	Validation of a dietary assessment instrument that records the consumption of ultra-processed foods (UPF) in a convenience sample of adults in Ecuador, 2021-2023.
Main researcher:	Wilma B. Freire, Universidad San Francisco de Quito
Sponsor:	London School of Hygiene & Tropical Medicine (LSHTM)

B. Type of modification	
Research with anonymous data collection and use of oral informed consent.	☐
Research with anonymous data collection and use of digital informed consent.	☑

C. Informed consent

We invite you to participate in the research "Validation of a dietary assessment instrument that captures the consumption of ultra-processed foods (UPF) in a convenience sample of adults in Ecuador. 2021-2023". Before you decide to participate read carefully all the information provided. Take as much time as you need to decide. You can consult with family and/or friends.

The purpose of this research is to learn about ultra-processed food consumption in Ecuador. We expect that approximately 310 people from Quito will participate in this study. The research will last approximately 24 months.

If you decide to participate in this research, we will ask you to fill out a two-section online survey in which you will have to answer the beverages and foods you consumed the previous day and recall all the foods you consumed 24 hours earlier, from the time you woke up until you went to bed. Completing the survey will take you approximately 45 minutes in total. You can answer all the questions in the survey, leave blank those you are not comfortable answering or stop the survey and leave at any time. It is likely that responding to this survey will cause you fatigue or nervousness. To reduce these risks, interviewers have been trained to conduct a cordial and respectful approach.

You will not receive compensation for your participation in this study. However, the results of this research will contribute to improve the assessment of food consumption in future populationtudies.

We will adopt all necessary measures to ensure the safety and confidentiality of your data:

- The survey is anonymous. No personally identifiable information will be collected.
- A unique code will be assigned to each participant.
- Only the main researcher, the statistician and the research assistant of this study will have access to the information collected.
- The main researcher will be responsible for safeguarding the information.
- The information will be stored in an encrypted database for a period of 10 years. When this period expires, the information will be destroyed.
- The information collected will remain confidential and will not be used for purposes other than this research.
- It is possible that the results of the research will be published or discussed in scientific lectures; however, individual data will not be used, only group data.

Your participation in this research is voluntary. You may refuse to participate. Likewise, participation in this research will not involve any cost for you.

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Cumbayá. P.O.Box: 17-12-841 Quito-Ecuador
T.: (593 2)297-1700 al 708. Fax.: (593 2)289 0070.
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Universidad San Francisco de Quito USFQ

2021-027M
VE4.0, June 16, 2021

If you have any questions about the research or its procedures, please contact us at the following telephone number (+593) 99-813- 1007or via email at freirewi@gmail.com

If you decide to participate, please click on the button below that says "I freely and voluntarily agree to participate in this research". Only then the survey will be displayed for you to complete. If you do not wish to participate, please click on the "Exit" button.

I freely and voluntarily agree to participate in this research.	Exit

Date: June 16, 2021

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