

**An exploration of the motives underlying the selection of the food outlets where
people purchase fresh foods in Montevideo, Uruguay**

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Conflict of interest statement

The authors declare no conflicting interests.

Ethical statement

The full protocol was approved by the Ethics committee of the School of Chemistry of Universidad de la República (Protocol No 101900-000018-23). Participants provided oral informed consent, which was formally recorded.

ABSTRACT

Objective: To explore the motives underlying the selection of the food outlets where people purchase 2 categories of fresh foods.

Design: Cross-sectional telephone survey, conducted in May 2024

Setting: Montevideo, Uruguay.

Participants: 505 adult residents of Montevideo involved in food purchasing for the household, recruited by a survey company.

Main Outcome Measures: Outlet where participants reported purchasing two categories of fresh foods (fruits and vegetables, and meat), and motives underlying their choice of store.

Analysis: Descriptive statistics and logistic regression models to assess the associations between the likelihood of purchasing the 2 categories at each type of store and motives underlying their choice, while controlling for socio-demographic variables.

Results: Farmers' markets, supermarkets, fruit and vegetable stores, and butchers' shops were identified as the primary outlets for purchasing the target categories. Price, quality, convenience and proximity were the most frequently mentioned motives underlying the choice of outlet. Likelihood of purchasing at different stores was significantly associated with motives underlying the choice of outlet and socio-economic characteristics.

Conclusions and Implications: People purchase fresh foods in different types of outlets due to a wide range of factors beyond proximity. Incorporating these factors in food environment research may contribute to develop more effective interventions.

Keywords: *food environment; food outlets; food purchase; fruits and vegetables*

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INTRODUCTION

The retail food environment represents the interphase through which people interact with the food system to purchase the foods they consume.¹⁻³ It influences dietary behaviors and health-related outcomes by shaping food availability, accessibility and affordability.^{3,4} For this reason, creating supportive retail food environments has been identified as one of the most effective strategies for promoting healthy and sustainable eating patterns.⁵

A vast body of research has focused on assessing physical access to food outlets selling healthy and unhealthy foods, based on the assumption that people rely on the outlets that are geographically close to their home.⁶⁻⁸ Although several studies have reported that living in areas with limited physical access to healthy food is associated with increased likelihood of unhealthy dietary habits and risk of obesity and non-communicable diseases,⁹⁻¹¹ the available evidence is still not conclusive and does not support a causal effect.¹²

One of the potential motives underlying non-conclusive evidence is the fact that food purchase decisions are complex and influenced by a wide range of individual and contextual characteristics.² Research conducted in high-income countries has shown that people frequently purchase foods in outlets located outside their residential

neighborhood.^{8,13–16} Reliance on price, convenience, and quality, for deciding where to purchase foods have been reported to explain why people bypass their closest food outlets and often visit multiple outlets.^{16–18}

Studies on the motives underlying the choice of food outlets is still scarce and limited to high-income countries, such as the USA and Australia.^{8,17,18} A more in-depth understanding of the complex interaction of individual and contextual factors that influence the decision of where to purchase foods may contribute to advance food environment research and inform the development of more efficient interventions to promote healthy eating.

In this context, the present research aimed at exploring the motives underlying the selection of the food outlets where people purchase foods in Montevideo, Uruguay. Focus was placed on 2 categories of fresh foods recommended by the Uruguayan dietary guidelines: fruits and vegetables and meat.¹⁹ These categories were selected based on previous local studies showing insufficient consumption, particularly among the most vulnerable sectors of the population.^{20,21} The following specific objectives were addressed: i) to identify the types of outlets where residents of Montevideo purchase the 2 target categories of fresh foods, ii) to explore the motives underlying the choice of outlet, and iii) to analyze associations between the likelihood of purchasing the 2 categories in a given outlet and the identified motives. Results from the present work are expected to contribute to fill a research gap related to how people interact with the retail environment, specially in Latin America, where food environment research is still scarce.²²

METHODS

The study was conducted in Montevideo, the capital city of Uruguay, a country located in the south-eastern coast of South America. Montevideo is located in the central southern region of the country, with a population of 1,670,545 inhabitants.²³ Uruguay is categorized by the World Bank as a high-income country ²⁴ and stands out in the region by its low inequality (Gini index = 0.408) and high human development index (HDI=0.809). ^{25,26} The country has one of the highest rates of overweight and obesity in the region among all age groups: 12% among children under 5 years old, 39.4% among school-age children, 33.8% among adolescents (13-17 years old), and 65% among adults (19-65 years old).²⁷

The study relied on a cross-sectional design based on a telephone survey. It was part of two larger projects focused on the retail food environment. The research protocol received full approval from the ethics committee of (blinded for review).

Participants

A telephone survey was conducted by a specialized survey company in May 2024. Trained interviewers contacted randomly selected residents in Montevideo, registered in the databases of the survey company. Participants meeting the following inclusion criteria were invited to participate: i) 18 years of age or older, ii) resident of Montevideo, and iii) involvement in food purchasing for the household. They were told that the survey

aimed at exploring the food purchase patterns of Montevideo residents. Participants provided informed oral consent, which was formally recorded.

A minimum sample size of 383 participants was required to estimate a proportion of 50% with a 5% margin of error and a 95% confidence interval. Quotas were established for residents of the eight municipalities in which the city is administratively divided to capture differences in purchase behaviors related to geographical and socio-demographic characteristics of the areas. Among eligible participants, the response rate was 75.7%.

Questionnaire

A questionnaire was developed by the research team to explore purchasing patterns of two categories of fresh foods: fruits and vegetables and meat. The questionnaire was composed of closed (Yes/No) and multiple-choice questions. Participants were asked about the type of outlet where they purchase most of the fruit, vegetables, and meat, for their household using the following question: '*Where do you usually purchase most of the (name of the food group)?*' Response options were not provided and interviewers coded the responses using the following options: Supermarket, Grocery store, Farmers' market, Fruit and vegetable store/butcher's shop, Other. In case of doubt, interviewees were instructed to type the exact response provided by participants. Motives underlying the choice of outlet were explored using a check-all-that-apply question: '*Why do you purchase fruits and vegetables there?*' Response options were not provided. Interviewers coded the responses using the following categories: Price, Quality, Proximity, Variety, Means of payment accepted, Opening times, Another reason

(specify). No specific instructions about the number of motives participants should mention were provided.

Participants were also asked to indicate the distance to the closest outlet selling each of the food groups. The last part of the survey focused on socio-demographic characteristics, including gender, age, education level, working status, car ownership, motorcycle ownership, neighborhood of residence, household composition, type of health assistance, and number of toilets in the household. These responses were used to estimate socio-economic status according to a standard methodology in the country.

²⁸

The full questionnaire is shown in the Supplementary Material Table 1. It was pilot tested by the company with 10 participants. Interviewers did not identify difficulties in the understanding of the questions and therefore no changes were introduced.

Data analysis

R software was used for all data analyses.²⁹ Descriptive statistics were used to summarize the data. The number and percentage of participants who provided each response were calculated for each question. Responses not included within the initial response options were coded using inductive coding.³⁰

Differences in the percentage of participants who mentioned each motive for explaining their choice of outlet for purchasing fruits and vegetables and meat were assessed using the sign test. A 5% significance level was considered.

Logistic regression models were used to analyze associations between the likelihood of purchasing each category (fruit and vegetables, meat) in a given outlet and

motives underlying the choice of outlet. For each category, outlets and motives mentioned by more than 10% of the participants were considered. Separate logistic regressions were run for each type of outlet and category. A binary variable indicating whether each participant reported purchasing the category at the specific type of outlet or not (1/0, respectively) was considered as dependent variable, whereas binary variables indicating whether the participant mentioned each of the motives for explaining their choice of outlet (1/0, respectively) were considered as predictors. The models controlled for gender, age range, education level, working status, car ownership, motorcycle ownership, socio-economic status, and blocks to the closest store selling the category. Results were expressed as odds-ratios. Participants who reported gender identities different from men or women (n=3) were not considered in the analyses given the insufficient statistical power to detect significant effects.

RESULTS

Participant characteristics

A total of 505 people, ranging in age from 19 to 91 years old (Mean=54.3, Standard deviation =14.9), participated in the survey. As shown in Table 1, participants were diverse in terms of all their socio-demographic characteristics. The sample overrepresented women and older participants, which can be explained by focus on individuals responsible for food purchasing for the household.³¹

Outlets were participants purchase fresh foods

The great majority of the participants reported purchasing the two categories of fresh foods: 96.2% for fruits and vegetables and 95.4% for meat. Approximately 2 out of 5 participants reported purchasing fruits and vegetables at farmers' markets (Table 2), whereas approximately 1 out of 4 participants identified supermarkets and fruit and vegetable stores as the primary outlets for purchasing this category. Meanwhile, supermarkets and butchers' shops were identified as the key outlets where participants purchased meat.

Self-reported distance to the closest outlet selling fruits and vegetables ranged between 0 and 50 blocks, with an average of 3.2 and a median of 2 (Table 2). Self-reported distance to the closest outlet selling meat tended to be slightly longer: the average corresponded to 4.7 blocks, whereas the median corresponded to 3 blocks.

Motives underlying the choice of outlet

A wide range of motives were mentioned by participants to explain why they purchased at their selected outlet (Table 2). Price, quality, convenience and proximity were the most frequently mentioned motives underlying the choice of outlet for the 2 categories. However, the frequency of mention of 10 of the 14 motives significantly differed between fruits and vegetables and meat. Price, convenience, variety, opening hours, and possibility of choosing products were more frequently mentioned when participants discussed their choice of outlet for purchasing fruits and vegetables compared to the outlets for purchasing meat. On the contrary, quality, proximity, trust, lack of outlets nearby, and

salesperson were more frequently mentioned as motives underlying the choice of outlet for purchasing meat.

Table 3 shows results of the logistic regressions analyzing associations between the motives and socio-demographic characteristics on the likelihood of purchasing fruits and vegetables at the three most frequently mentioned types of outlets: supermarkets, farmers' markets, and fruit and vegetable stores. Mentioning convenience as a motive for choosing the outlet was associated with a 154% increase in the likelihood of purchasing fruits and vegetables at the supermarket, when controlling for all other variables (Table 3). Conversely, mentioning price as a motive was associated with a 92% decrease in likelihood. Socio-economic status was the only socio-demographic characteristic with a significant effect. Participants living in low and medium socio-economic status households had a lower likelihood of purchasing fruits and vegetables at the supermarket compared to those living in households of high socio-economic status.

The likelihood of purchasing fruits and vegetables at farmers' markets was significantly associated with three motives: price, convenience and proximity. As shown in Table 3, mentioning price as a motive was associated with a 384% increase in the likelihood of purchasing fruits and vegetables at farmers' markets, whereas mentioning convenience and proximity were associated with a 47% and 56% decrease, respectively. Meanwhile, none of the motives was significantly associated with the likelihood of purchasing this category at fruit and vegetable stores. The model only identified marginally significant associations with convenience and socio-economic status (Table 3). Mentioning convenience was associated with a marginal decrease in the likelihood

of purchasing fruits and vegetables at fruit and vegetable stores, whereas living in a medium socio-economic status household was associated with an increase in likelihood compared to living in a high socio-economic status household.

As shown in Table 4, the likelihood of purchasing meat at supermarkets was significantly associated with the four motives included in the model, when controlling for socio-demographic variables. The likelihood of purchasing meat at supermarkets increased when participants mentioned convenience and proximity as motives underlying their choice of outlet, whereas it significantly decreased when they mentioned price and quality. Gender and socioeconomic status were the only socio-demographic characteristics significantly associated with the likelihood of purchasing meat at the supermarket (Table 4). Males were 45% less likely to purchase meat at supermarkets compared to females. Participants from low and medium socio-economic status households were 60% and 50% less likely, respectively, to buy meat at the supermarket compared to those from high socio-economic status households.

Finally, the likelihood of purchasing meat at the butcher's was significantly associated with only 3 of the 4 motives included in the model. Participants mentioning price as motive underlying their choice of outlet were 65% more likely to purchase meat at the butcher's, whereas those mentioning convenience and proximity were 84% and 46% less likely, respectively (Table 4).

DISCUSSION

The current study contributed to the literature by exploring the sources of outlets for two categories of fresh, unprocessed foods in the capital city of Uruguay, a Latin American country. Results showed that households rely on different types of outlets for purchasing fresh foods. Farmers' markets, fruit and vegetable stores and supermarkets were identified as the key source for fruits and vegetables, whereas supermarkets and butcher's shops were the main sources for meat. These results suggest that considering supermarkets as the only indicator of the availability of healthy foods, as currently done in studies conducted in Europe and the USA,⁶ may lead to inaccurate conclusions on food availability in Montevideo. The relevance of small neighborhood stores as source of healthy foods has been reported by other studies conducted low and middle-income countries in Africa and Latin America.^{32–37}

Participants referred to a wide range of motives beyond proximity for explaining their choice of outlet for purchasing the two categories. Price was the most frequently reported motive underlying the choice of outlet where to purchase fruits and vegetables, whereas quality was the most relevant factor for selecting where to purchase meat. These results support the notion that people do not necessarily purchase at their closest store, in agreement with results from previous studies conducted in high-income countries.^{8,13–16} In the specific case of Uruguay, a previous qualitative study reported that proximity was not among the key factors determining the food purchase decisions of citizens experiencing food insecurity.²¹

Therefore, proximity to food outlets may not be the key determinant of food purchasing in Montevideo, as hypothesized in most urban food environment studies.^{6,38–}

⁴⁰ This stresses the need to acknowledge the complexity between individuals and food

environments, as postulated by the Retail Food Environment and Customer Interaction Model.² The choice of outlet where to purchase foods is expected to be influenced by characteristics of the individuals, their households, the location of outlets, the foods available at retail outlets, as well as societal and cultural factors.^{2,41,42} Results from the present work show that the relative importance of these characteristics varies across food groups, suggesting that people may rely on different types of outlets. In this sense, previous studies have shown that people frequently tend to purchase at a wide range of different food outlets.^{13,14,16,17,43}

Apart from proximity, price, quality and convenience were paramount for participants when deciding where to purchase fresh foods. These characteristics have been identified as important determinants of food purchase locations in studies conducted in high income countries.^{16–18} Price has been identified as a key determinant of where and what people purchase, particularly among those living in low-income households.^{8,41,44–47} People facing economic difficulties to access food have been reported to engage in a complex set of behaviors to stretch their income, including travelling long distances to make their food purchases.^{21,48} In the present work, focus on price was associated with a reduced likelihood of purchasing fresh foods at supermarkets, and an increased likelihood of purchasing fruits and vegetables at farmers' markets and meat at butchers' shops. These results suggest price differences across different types of stores. Previous studies conducted in high-income countries have reported that such differences may exist.^{49–53} However, results point towards lower prices at supermarkets compared to small stores due to economy of scale and more favorable agreements with suppliers.^{49–51} Research on the topic is needed in Uruguay

and Latin American countries to inform the development of strategies to improve access to food and promote healthy eating.

The intrinsic characteristics of the foods available at food outlets were mentioned by participants to explain their choice of outlet. Approximately 3 out of 10 participants mentioned quality when discussing where they purchased the 2 categories, whereas 1 out of 10 mentioned variety when discussing fruit and vegetable purchasing.^{54,55} This result matches the increase in consumers' interest in food quality worldwide.^{55,56} Emphasis on quality was significantly associated with a decreased likelihood of purchasing meat at supermarkets and marginally associated with an increased likelihood of purchasing meat at butchers' shops.

Convenience also emerged as a determinant of food purchase locations in terms of time saving aspects achieved by the wide range of foods offered. In this sense, convenience was associated with an increased likelihood of purchasing at supermarkets, which can be explained by their diverse food supply. The relevance of convenience has been previously reported in a qualitative study exploring factors underlying the food shopping patterns of black women in Philadelphia, USA.¹⁷ In addition, this factor has been reported as a highly relevant determinant of food choice in the context of modern lifestyle, characterized by perceived time scarcity.^{41,57–60}

The findings also showed that the likelihood of purchasing the two categories at different types of outlets differed with personal and household characteristics, when controlling for the motives underlying the choice of outlet. In particular, high-income participants were more likely to purchase the two categories at supermarkets, which may be associated with the more frequent presence of supermarkets in high-income areas of

the cities, as reported both in Uruguay and in high-income countries.^{61–63} These results provide evidence on the role of individual and contextual factors on how people interact with the food environment.

IMPLICATIONS FOR RESEARCH AND PRACTICE

Creating supportive food environments is paramount for encouraging healthier eating habits.⁵ The present work provides relevant insights for the development of strategies to achieve this objective by exploring the food purchase decisions of residents of Montevideo (Uruguay). Results showed that citizens purchase fresh foods in different types of outlets due to a wide range of factors beyond proximity. This suggests that strategies aiming to improve food environments may not be efficient at promoting healthier eating habits if they are exclusively targeted at supermarkets or focused on physical access. A wide range of outlets need to be considered taking into account the characteristics of their customers. Results showed that supermarkets may be a relevant setting for targeting high socio-economic status citizens, whereas farmers' markets and small neighborhood stores (e.g., butchers' shops) seem a feasible context for the implementation of strategies to promote healthier eating among low and middle socio-economic status citizens. Results also suggest that strategies should address aspects of the food purchasing experience beyond proximity, particularly price and convenience.

Taken together, the findings suggest the need to develop broader conceptualizations of food access that go beyond physical access to food to better

understand consumers' interactions with the food environment, as previously highlighted by other authors.^{2,39,64} In particular, food price and quality emerged as two of the most relevant dimensions that need to be further incorporated in food environment research. Despite the inclusion of these dimensions increases complexity, a couple of published studies conducted in developed countries show its feasibility.^{65,66}

REFERENCES

1. HLPE. *Nutrition and Food Systems. A Report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security*. Committee on World Food Security; 2017.
2. Winkler MR, Zenk SN, Baquero B, et al. A model depicting the retail food environment and customer interactions: Components, outcomes, and future directions. *Int J Environ Res Public Health*. 2020;17(20):1-21. doi:10.3390/ijerph17207591
3. Herforth A, Ahmed S. The food environment, its effects on dietary consumption, and potential for measurement within agriculture-nutrition interventions. *Food Secur*. 2015;7(3):505-520. doi:10.1007/s12571-015-0455-8
4. Konapur A, Gavaravarapu SRM, Nair KM. The 5 A's Approach for Contextual Assessment of Food Environment. *J Nutr Educ Behav*. 2022;54(7):621-635. doi:10.1016/j.jneb.2022.02.017
5. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: Policy and environmental approaches. *Annu Rev Public Health*. 2008;29:253-272. doi:10.1146/annurev.publhealth.29.020907.090926
6. Ares G, Turra S, Bonilla L, et al. WEIRD and non-consensual food deserts and swamps: A scoping review of operational definitions. *Health Place*. 2024;In press:103315. doi:10.1016/j.healthplace.2024.103315
7. Titis E, Procter R, Walasek L. Assessing physical access to healthy food across United Kingdom: A systematic review of measures and findings. *Obes Sci Pract*. 2022;8(2):233-246. doi:10.1002/osp4.563

- 328 8. Drewnowski A, Aggarwal A, Hurvitz PM, Monsivais P, Moudon A V. Obesity and
329 Supermarket Access: Proximity or Price? *Am J Public Health*. 2012;102(8):e74-e80.
330 doi:10.2105/AJPH.2012.300660
- 331 9. Cooksey-Stowers K, Schwartz M, Brownell K. Food Swamps Predict Obesity Rates
332 Better Than Food Deserts in the United States. *Int J Environ Res Public Health*.
333 2017;14(11):1366. doi:10.3390/ijerph14111366
- 334 10. Hager ER, Cockerham A, O'Reilly N, et al. Food swamps and food deserts in
335 Baltimore City, MD, USA: associations with dietary behaviours among urban
336 adolescent girls. *Public Health Nutr*. 2017;20(14):2598-2607.
337 doi:10.1017/S1368980016002123
- 338 11. Garg G, Tedla YG, Ghosh AS, et al. Supermarket Proximity and Risk of Hypertension,
339 Diabetes, and CKD: A Retrospective Cohort Study. *American Journal of Kidney*
340 *Diseases*. 2023;81(2):168-178. doi:10.1053/j.ajkd.2022.07.008
- 341 12. Zhen C. Food Deserts: Myth or Reality? *Annu Rev Resour Economics*.
342 2021;13(1):109-129. doi:10.1146/annurev-resource-101620-080307
- 343 13. Thornton LE, Crawford DA, Lamb KE, Ball K. Where do people purchase food? A novel
344 approach to investigating food purchasing locations. *Int J Health Geogr*.
345 2017;16(1):9. doi:10.1186/s12942-017-0082-z
- 346 14. Chrisinger BW, Kallan MJ, Whiteman ED, Hillier A. Where do U.S. households
347 purchase healthy foods? An analysis of food-at-home purchases across different
348 types of retailers in a nationally representative dataset. *Prev Med (Baltim)*.
349 2018;112:15-22. doi:10.1016/j.ypmed.2018.03.015
- 350 15. Kerr J, Frank L, Sallis JF, Saelens B, Glanz K, Chapman J. Predictors of trips to food
351 destinations. *International Journal of Behavioral Nutrition and Physical Activity*.
352 2012;9(1):58. doi:10.1186/1479-5868-9-58
- 353 16. Laska MN, Graham DJ, Moe SG, Van Riper D. Young Adult Eating and Food-
354 Purchasing Patterns. *Am J Prev Med*. 2010;39(5):464-467.
355 doi:10.1016/j.amepre.2010.07.003
- 356 17. DiSantis KI, Hillier A, Holaday R, Kumanyika S. Why do you shop there? A mixed
357 methods study mapping household food shopping patterns onto weekly routines of
358 black women. *International Journal of Behavioral Nutrition and Physical Activity*.
359 2016;13(1):11. doi:10.1186/s12966-016-0333-6

- 360 18. Dangerfield F, Ball K, Dickson-Swift V, Thornton LE. Understanding regional food
361 environments: A qualitative exploration of food purchasing behaviour. *Health Place*.
362 2021;71:102652. doi:10.1016/j.healthplace.2021.102652
- 363 19. Ministerio de Salud Pública. *Guía Alimentaria Para La Población Uruguaya. Para Una*
364 *Alimentación Saludable, Compartida y Placentera*. Ministerio de Salud Pública;
365 2016. [https://www.gub.uy/ministerio-desarrollo-](https://www.gub.uy/ministerio-desarrollo-social/comunicacion/publicaciones/guia-alimentaria-para-la-poblacion-uruguaya)
366 [social/comunicacion/publicaciones/guia-alimentaria-para-la-poblacion-uruguaya](https://www.gub.uy/ministerio-desarrollo-social/comunicacion/publicaciones/guia-alimentaria-para-la-poblacion-uruguaya)
- 367 20. Instituto Nacional de Estadística. *Encuesta Nacional de Gastos e Ingresos de Los*
368 *Hogares 2016-2017*. Instituto Nacional de Estadística; 2017.
- 369 21. Machín L, Brunet G, Fajardo G, et al. Exploring food purchase decisions in food
370 insecure households: An exploratory qualitative study in an emerging Latin American
371 country. *Food Qual Prefer*. 2024;116:105146. doi:10.1016/j.foodqual.2024.105146
- 372 22. Turner C, Aggarwal A, Walls H, et al. Concepts and critical perspectives for food
373 environment research: A global framework with implications for action in low- and
374 middle-income countries. *Glob Food Sec*. 2018;18:93-101.
375 doi:10.1016/j.gfs.2018.08.003
- 376 23. Catálogo de datos geográficos de Montevideo. Viviendas por zonas 2011 [Housing by
377 zones 2011]. 2024. Accessed April 16, 2024.
378 [https://geoweb.montevideo.gub.uy/geonetwork/srv/spa/catalog.search#/metadata/](https://geoweb.montevideo.gub.uy/geonetwork/srv/spa/catalog.search#/metadata/8edc1e6d-b82f-4145-9610-af8c51e629fa)
379 [8edc1e6d-b82f-4145-9610-af8c51e629fa](https://geoweb.montevideo.gub.uy/geonetwork/srv/spa/catalog.search#/metadata/8edc1e6d-b82f-4145-9610-af8c51e629fa)
- 380 24. International Monetary Fund. GDP per capita, current prices.
381 [https://www.imf.org/external/datamapper/NGDPDPC@WEO/URY?zoom=URY&highli](https://www.imf.org/external/datamapper/NGDPDPC@WEO/URY?zoom=URY&highlight=URY)
382 [ght=URY](https://www.imf.org/external/datamapper/NGDPDPC@WEO/URY?zoom=URY&highlight=URY).
- 383 25. The World Bank. Uruguay. 2023. Accessed May 24, 2023.
384 <https://data.worldbank.org/country/uruguay>
- 385 26. United Nations Development Program. Human Development Reports. Uruguay.
386 2023. Accessed May 24, 2023. [https://hdr.undp.org/data-center/specific-country-](https://hdr.undp.org/data-center/specific-country-data#/countries/URY)
387 [data#/countries/URY](https://hdr.undp.org/data-center/specific-country-data#/countries/URY)
- 388 27. Parlamento del Uruguay. *Diálogo Nacional “Uruguay: Hacia Sistemas Alimentarios*
389 *Más Saludables, Sostenibles e Inclusivos.”*; 2021.
- 390 28. Centro de Investigaciones Económicas. *Índice de Nivel Socioeconómico*. Centro de
391 Investigaciones Económicas; 2023.

- 392 29. R Core Team. R: A language and environment for statistical computing. Published
393 online 2024.
- 394 30. Krippendorff K. *Content Analysis: An Introduction to Its Methodology*. Sage; 2004.
- 395 31. Instituto Nacional de Estadística. *Encuesta Sobre Uso Del Tiempo y Trabajo No*
396 *Remunerado [Survey on Time Use and Unpaid Work]*. Instituto Nacional de
397 Estadística; 2022.
- 398 32. Farah I, Stern D, Ramírez Y, et al. Food and beverage purchases at formal and
399 informal outlets in Mexico. *Public Health Nutr*. 2023;26(5):1034-1043.
400 doi:10.1017/S1368980022002324
- 401 33. Ortiz-Hernández L, Romo-Avilés M, Rosales Chavez JB. Main Retailers In Which
402 Mexican Households Acquire Their Food Supply. *J Nutr Educ Behav*. 2022;54(8):718-
403 727. doi:10.1016/j.jneb.2022.04.213
- 404 34. Battersby J. Beyond the food desert: Finding ways to speak about urban food security
405 in South Africa. *Geogr Ann Ser B*. 2012;94(2):141-159. doi:10.1111/j.1468-
406 0467.2012.00401.x
- 407 35. Chuvileva YE, Manangan A, Chew A, et al. What North American retail food
408 environment indices miss in Guatemala: Cultural considerations for the study of
409 place and health. *Applied Geography*. 2024;164:103204.
410 doi:10.1016/j.apgeog.2024.103204
- 411 36. Battersby J, Crush J. Africa's Urban Food Deserts. *Urban Forum*. 2014;25(2):143-151.
412 doi:10.1007/s12132-014-9225-5
- 413 37. Crush J, Nickanor N, Kazembe L. Informal food deserts and household food
414 insecurity in Windhoek, Namibia. *Sustainability (Switzerland)*. 2019;11(1):1-15.
415 doi:10.3390/su11010037
- 416 38. Lytle LA, Sokol RL. Measures of the food environment: A systematic review of the
417 field, 2007–2015. *Health Place*. 2017;44:18-34.
418 doi:10.1016/j.healthplace.2016.12.007
- 419 39. Charreire H, Casey R, Salze P, et al. Measuring the food environment using
420 geographical information systems: a methodological review. *Public Health Nutr*.
421 2010;13(11):1773-1785. doi:10.1017/S1368980010000753
- 422 40. Sawyer ADM, van Lenthe F, Kamphuis CBM, et al. Dynamics of the complex food
423 environment underlying dietary intake in low-income groups: a systems map of
424 associations extracted from a systematic umbrella literature review. *International*

- 425 *Journal of Behavioral Nutrition and Physical Activity*. 2021;18(1):96.
 426 doi:10.1186/s12966-021-01164-1
- 427 41. Karanja A, Ickowitz A, Stadlmayr B, McMullin S. Understanding drivers of food choice
 428 in low- and middle-income countries: A systematic mapping study. *Glob Food Sec*.
 429 2022;32:100615. doi:10.1016/j.gfs.2022.100615
- 430 42. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and
 431 eating environments: Policy and environmental approaches. *Annu Rev Public Health*.
 432 2008;29:253-272. doi:10.1146/annurev.publhealth.29.020907.090926
- 433 43. Gustafson A, Christian JW, Lewis S, Moore K, Jilcott S. Food venue choice, consumer
 434 food environment, but not food venue availability within daily travel patterns are
 435 associated with dietary intake among adults, Lexington Kentucky 2011. *Nutr J*.
 436 2013;12(1):17. doi:10.1186/1475-2891-12-17
- 437 44. Hough G, Sosa M. Food choice in low income populations - A review. *Food Qual*
 438 *Prefer*. 2015;40(PB):334-342. doi:10.1016/j.foodqual.2014.05.003
- 439 45. Magano NN, Tuorila H, De Kock HL. Food choice drivers at varying income levels in
 440 an emerging economy. *Appetite*. 2023;189:107001.
 441 doi:10.1016/j.appet.2023.107001
- 442 46. Wiig Dammann K, Smith C. Factors Affecting Low-income Women's Food Choices
 443 and the Perceived Impact of Dietary Intake and Socioeconomic Status on Their
 444 Health and Weight. *J Nutr Educ Behav*. 2009;41(4):242-253.
 445 doi:10.1016/j.jneb.2008.07.003
- 446 47. Blake CE, Frongillo EA, Warren AM, Constantinides S V., Rampalli KK, Bhandari S.
 447 Elaborating the science of food choice for rapidly changing food systems in low-and
 448 middle-income countries. *Glob Food Sec*. 2021;28:100503.
 449 doi:10.1016/j.gfs.2021.100503
- 450 48. Folta SC, Anyanwu O, Pustz J, Oslund J, Penkert LP, Wilson N. Food Choice With
 451 Economic Scarcity and Time Abundance: A Qualitative Study. *Health Education &*
 452 *Behavior*. 2022;49(1):150-158. doi:10.1177/10901981211045926
- 453 49. Rimkus L, Isgor Z, Ohri-Vachaspati P, et al. Disparities in the Availability and Price of
 454 Low-Fat and Higher-Fat Milk in US Food Stores by Community Characteristics. *J Acad*
 455 *Nutr Diet*. 2015;115(12):1975-1985. doi:10.1016/j.jand.2015.04.002

- 456 50. Caspi C, Pelletier J, Harnack L, Erickson D, Lenk K, Laska M. Pricing of Staple Foods
457 at Supermarkets versus Small Food Stores. *Int J Environ Res Public Health*.
458 2017;14(8):915. doi:10.3390/ijerph14080915
- 459 51. Aalto-Setälä V. Economies of scale in grocery retailing in Finland. *Journal of Retailing*
460 *and Consumer Services*. 2000;7(4):207-213. doi:10.1016/S0969-6989(00)00018-7
- 461 52. Sadler RC, Gilliland JA, Arku G. Community Development and the Influence of New
462 Food Retail Sources on the Price and Availability of Nutritious Food. *J Urban Aff*.
463 2013;35(4):471-491. doi:10.1111/j.1467-9906.2012.00624.x
- 464 53. Krukowski RA, West DS, Harvey-Berino J, Elaine Prewitt T. Neighborhood Impact on
465 Healthy Food Availability and Pricing in Food Stores. *J Community Health*.
466 2010;35(3):315-320. doi:10.1007/s10900-010-9224-y
- 467 54. Sadilek T. Perception of Food Quality by Consumers: Literature Review. *European*
468 *Research Studies Journal*. 2019;XXII(1):52-62.
- 469 55. Petrescu DC, Vermeir I, Petrescu-Mag RM. Consumer Understanding of Food Quality,
470 Healthiness, and Environmental Impact: A Cross-National Perspective. *Int J Environ*
471 *Res Public Health*. 2019;17(1):169. doi:10.3390/ijerph17010169
- 472 56. Rai S, Wai PP, Koirala P, et al. Food product quality, environmental and personal
473 characteristics affecting consumer perception toward food. *Front Sustain Food Syst*.
474 2023;7. doi:10.3389/fsufs.2023.1222760
- 475 57. Mela DJ. Determinants of food choice: relationships with obesity and weight control.
476 *Obes Res*. 2001;9 Suppl 4(November). doi:10.1038/oby.2001.127
- 477 58. Machín L, Giménez A, Vidal L, Ares G. Influence of Context on Motives Underlying
478 Food Choice. *J Sens Stud*. 2014;29(5). doi:10.1111/joss.12107
- 479 59. Russell CG, Worsley A, Liem DG. Parents' food choice motives and their associations
480 with children's food preferences. *Public Health Nutr*. 2015;18(6):1018-1027.
481 doi:10.1017/S1368980014001128
- 482 60. Vidal L, Iragola V, Machín L, et al. A Qualitative Exploration of Parents' Food Choices
483 During Early Childhood. *J Nutr Educ Behav*. 2022;54(8):764-775.
484 doi:10.1016/j.jneb.2022.03.006
- 485 61. Walker RE, Keane CR, Burke JG. Disparities and access to healthy food in the United
486 States: A review of food deserts literature. *Health Place*. 2010;16(5):876-884.
487 doi:10.1016/j.healthplace.2010.04.013

62. Deener A. The origins of the food desert: Urban inequality as infrastructural exclusion. *Social Forces*. 2017;95(3):1285-1309. doi:10.1093/sf/sox001
63. Ares G, Alcaire F, Brunet G, et al. Outlets source of foods in Montevideo: Implications for retail food environment research in emerging countries. *J Nutr Educ Behav*. 2024;In press.
64. Caspi CE, Sorensen G, Subramanian S V., Kawachi I. The local food environment and diet: A systematic review. *Health Place*. 2012;18(5):1172-1187. doi:10.1016/j.healthplace.2012.05.006
65. Slater J, Epp-Koop S, Jakilazek M, Green C. Food deserts in Winnipeg, Canada: A novel method for measuring a complex and contested construct. *Health Promotion and Chronic Disease Prevention in Canada*. 2017;37(10):350-356. doi:10.24095/hpcdp.37.10.05
66. Križan F, Bilková K, Kita P, Horňák M. Potential food deserts and food oases in a post-communist city: Access, quality, variability and price of food in Bratislava-Petržalka. *Applied Geography*. 2015;62:8-18. doi:10.1016/j.apgeog.2015.04.003

Table 1. Characteristics of the participants of the telephone survey (n=505).

Characteristic	Number of participants	Percentage of participants (%)
<i>Gender</i>		
Man	318	63.0
Woman	184	36.4
Other	3	0.6
<i>Age</i>		
18-34	53	10.5
35-45	93	18.4
46-65	232	45.9
65+	127	25.2
<i>Education level</i>		
Incomplete secondary school or less	126	25.0
Complete secondary school	183	36.2
University or higher	196	38.8
<i>Working status</i>		
Currently working	320	63.4
Not working	185	36.6
<i>Car ownership</i>		
Yes	286	56.6
No	219	43.4
<i>Motorcycle ownership</i>		
Yes	45	10.7
No	451	89.3
<i>Municipality of residence</i>		
A	65	12.9
B	59	11.7
C	62	12.3
CH	85	16.8
D	55	10.9
E	66	13.1
F	52	10.3
G	61	12.1
<i>Socio-economic status of the household (*)</i>		
Low	83	16.4
Medium	226	44.8
High	196	38.8

(*) Socio-economic status was calculated based on the national socio-economic index, which calculates a score based on place of residence, household composition, working status, education level, and possession of a series of specific goods.²⁸

Table 2. Number and percentage of participants who declared purchasing fruits and vegetables and meat in different types of outlets, motives underlying their choices and descriptive statistics of self-reported distance to the closest outlet selling each food category.

	Fruits and vegetables		Meat	
	Number of participants	Percentage of participants (%)	Number of participants	Percentage of participants (%)
<i>Type of outlet</i>				
Supermarket	122	24.2	239	47.3
Grocery store	25	5.0	6	1.2
Farmers' market	191	37.8	5	1.0
Fruit and vegetable stores	138	27.3	-	-
Butchers' shops	-	-	224	44.4
Others (e.g., wholesaler, directly from producers)	10	2.0	8	1.6
Not purchased	19	3.8	23	4.6
<i>Motives underlying the choice of outlet (#)</i>				
Price *	230	47.3	115	19.8
Quality *	139	28.6	193	33.2
Convenience *	120	24.7	81	13.9
Proximity *	105	21.6	143	24.6
Variety *	57	11.7	17	2.9
Opening hours *	26	5.3	7	1.2
Possibility of choosing products *	15	3.1	1	0.2
Habit	13	2.7	13	2.2
Home delivery	10	2.1	3	0.5
Trust *	8	1.6	22	3.8
Local purchases	9	0.6	1	0.2
Lack of outlets nearby *	3	0.6	10	1.7
Salesperson *	2	0.4	9	1.5
Payment method	1	0.2	2	0.3
<i>Blocks to the closest outlet selling the food category</i>				
Minimum	0		0	
Average	3.2		4.7	
Median	2		3	
Maximum	50		40	
Standard deviation	4.9		5.9	

Notes: Values within a column do not sum up to 100% as participants could indicate more than one motive.

(#) Percentages are calculated considering the number of participants who reported purchasing the category: n=486 for fruits and vegetables, n=482 for meat. Motives identified with * differed in their frequency of mention between fruits and vegetables and meat according to the sign test for a significance level of 0.05.

Table 3. Results of the logistic regression models, expressed as odds-ratios (with 95% confidence intervals), exploring associations between motives and socio-demographic characteristics on the likelihood of purchasing fruit and vegetables at supermarkets, farmers' markets or fruit and vegetable stores.

	Type of outlet		
	Supermarkets	Farmers' markets	Fruit and vegetables stores
<i>Motives</i>			
Price	0.08 (0.04-0.16)	4.84 (3.08-7.74)	1.04 (0.65-1.66)
Quality	0.56 (0.28-1.09) •	0.91 (0.56-1.47)	1.42 (0.87-2.31)
Convenience	2.54 (1.40-4.66)	0.53 (0.29-0.95)	0.60 (0.33-1.07) •
Proximity	1.17 (0.62-2.21)	0.44 (0.23-0.79)	1.57 (0.90-2.71)
Variety	0.69 (0.23-1.81)	1.57 (0.82-3.03)	0.88 (0.45-1.68)
<i>Gender</i>			
Female	1	1	1
Male	0.83 (0.48-1.43)	0.83 (0.52-1.31)	1.22 (0.77-1.91)
<i>Age</i>			
18-34	1	1	1
35-45	1.81 (0.60-5.82)	1.11 (0.49-2.54)	0.91 (0.40-2.12)
45-64	1.33 (0.51-3.84)	1.08 (0.52-2.24)	1.26 (0.63-2.62)
65+	1.30 (0.42-4.24)	1.60 (0.68-3.81)	0.97 (0.42-2.26)
<i>Education level</i>			
Incomplete high school or less	1	1	1
Complete high school	1.82 (0.86-3.97)	1.36 (0.77-2.43)	0.70 (0.41-1.21)
University or higher	1.91 (0.89-4.21)	1.09 (0.59-2.04)	0.72 (0.40-1.30)
<i>Working status</i>			
Currently working	0.68 (0.33-1.41)	1.24 (0.71-2.17)	1.09 (0.64-1.87)
<i>Car ownership</i>			
Yes	1.06 (0.57-1.96)	0.89 (0.53-1.47)	0.97 (0.60-1.58)
<i>Motorcycle ownership</i>			
Yes	0.78 (0.27-2.03)	0.81 (0.39-1.66)	1.34 (0.68-2.57)
<i>Socio-economic status</i>			
Low	0.33 (0.12-0.87)	0.74 (0.33-1.63)	1.73 (0.65-3.72)
Medium	0.44 (0.23-0.83)	0.82 (0.46-1.43)	1.72 (0.99-2.98) •
High	1	1	1
<i>Blocks to the closest store</i>	0.98 (0.91-1.03)	1.01 (0.96-1.06)	1.01 (0.97-1.05)

Note: Odds-ratios significantly different from 0 at a significance level of 0.05 are highlighted with bold,

whereas those marginally significant at 0.10 are highlighted with •.

Table 4. Results of the logistic regression models, expressed as odds-ratios (with 95% confidence intervals), exploring associations between motives and socio-demographic characteristics on the likelihood of purchasing meat at supermarkets or butchers' shops.

	Type of outlet	
	Supermarkets	Butchers' shops
<i>Motives</i>		
Price	0.52 (0.31-0.86)	1.65 (1.01-2.70)
Quality	0.62 (0.39-0.97)	1.54 (0.99-2.42) •
Convenience	5.82 (2.97-12.05)	0.16 (0.07-0.32)
Proximity	1.68 (1.03-2.76)	0.58 (0.35-0.95)
<i>Gender</i>		
Female	1	1
Male	0.55 (0.36-0.86)	1.49 (0.97-2.31)
<i>Age</i>		
18-34	1	1
35-45	0.79 (0.36-1.74)	1.16 (0.53-2.56)
45-64	0.79 (0.38-1.60)	1.21 (0.60-2.46)
65+	0.75 (0.33-1.71)	1.07 (0.47-2.45)
<i>Education level</i>		
Incomplete high school or less	1	1
Complete high school	1.51 (0.88-2.61)	0.70 (0.41-1.20)
University or higher	1.01 (0.56-1.82)	0.95 (0.53-1.70)
<i>Working status</i>		
Not working	1	1
Currently working	0.85 (0.50-1.43)	1.03 (0.61-1.73)
<i>Car ownership</i>		
Yes	1.27 (0.79-2.04)	0.71 (0.44-1.13)
<i>Motorcycle ownership</i>		
Yes	0.92 (0.46-1.80)	1.25 (0.64-2.45)
<i>Socioeconomic status</i>		
Low	0.40 (0.19-0.85)	1.94 (0.93-1.00) •
Medium	0.50 (0.29-0.84)	2.02 (1.20-3.41)
High	1	1
<i>Blocks to the closest store</i>	1.03 (1.00-1.08) •	0.97 (0.93-1.00) •

Note: Odd-ratios significantly different from 1.0 at a significance level of 0.05 are highlighted with bold, whereas those marginally significant at 0.10 are highlighted with •.

Supplementary Material

Table 1. Wording of the questions and response options.

Question	Response option
In a typical week, how many days do you eat fruit?	Numerical answer: 0 to 7
How many servings of fruit do you eat on each of these days? One serving corresponds to a fruit the size of a medium apple	Numerical answer
Do you think you consume enough fruit?	Yes/No
<i>If No...</i>	
Why do you think you don't eat enough fruit?	Open-ended question
In a typical week, how many days do you eat vegetables?	Numerical answer: 0 to 7
How many servings of vegetables do you eat on each of these days? One serving corresponds to half a plate of vegetables	Numerical answer
Do you think you consume enough vegetables?	Yes/No
<i>If No...</i>	
Why do you think you don't eat enough vegetables?	Open-ended question
Do you purchase fruits and vegetables in your household?	Yes No
Where do you usually purchase most of the fruits and vegetables?	Supermarket Grocery store Farmers' market Fruit and vegetable store Other, which one? (specify)
Why do you purchase fruits and vegetables there?	Price Quality Proximity Variety Means of payment accepted Opening times Another reason, which one? (specify)
What means of transportation do you usually use to go to the place where you purchase most of the fruits and vegetables?	Walking Car Motorcycle or scooter Bicycle Bus Taxi Other (specify)
From where do you usually go to the place where you purchase most of the fruits and vegetables?	From home From work From another place (specify)
How long does it usually take you to get to the place where you purchase most of the fruits and vegetables?	Numerical response (in minutes)
Do you usually purchase meat in your household?	Yes No
Where do you usually purchase most of the meat?	Supermarket Grocery store

	Farmers' market Butchers' Other, which one? (specify)
Why do you purchase meat there?	Price Quality Proximity Variety Means of payment accepted Opening times Another reason, which one? (specify)
What means of transportation do you usually use to go to the place where you purchase most of the meat?	Walking Car Motorcycle or scooter Bicycle Bus Taxi Other (specify)
From where do you usually go to the place where you purchase most of the meat?	From home From work From another place (specify)
How long does it usually take you to get to the place where you purchase most of the meat?	Numerical response (in minutes)