Perceived Purchase of Healthy Foods Is Associated With Regular Consumption of Fruits and Vegetables

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ABSTRACT

Objective: To identify healthy food (HF) purchase habits and intake of fruits and vegetables (FV) in parents responsible for grocery shopping for their families.

Methods: Survey with mothers and fathers (n = 216) of children aged 7–10 years in Brazil.

Results: Grocery purchases occurred mostly at supermarkets. Purchase of HF was considered to be frequent by 80% of parents, who cited FV as main examples of HF. The more frequent the reported purchase was of HF, the higher was the prevalence of regular consumption of FV ($P = .002$). Only 34% of respondents reported weekly intakes that could be classified as regular.

Conclusions and Implications: Perceived frequent shopping for healthy foods was positively associated with regular consumption of FV but a gap between perception and behavior was identified. Nutrition education strategies need to go beyond a merely informative role and take consumers' opinions and points of view into consideration to become truly effective.

Key Words: children, family, parents, supermarkets, consumer behavior, fruit, vegetable (*J Nutr Educ Behav*. 2015;47:248-252.)

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INTRODUCTION

Inadequate diets can be an important risk factor for non-communicable chronic diseases.[1] Reducing the intake of processed energy-dense and nutrient-poor foods and increasing the intake of fruits and vegetables (FV) are important to promote healthy diets.[1] The Dietary Guidelines for the Brazilian Population define a healthy diet as "one consisting of colorful meals which include the daily intake of whole grains, beans, fruits, vegetables, milk and other dairy products, lean beef, poultry or fish."[2]

The choice of what to eat is not determined solely by physiological or nutritional needs.[3] Food choices result from the competing, reinforcing, and interacting influences of a variety of factors, including individual, social, environmental, and economic ones.[4] Food choices also involve food-purchasing habits, determining which foods will be available for the family's consumption. Therefore, cost also has an important part in the food choices process.[3] It is common for healthy foods to be associated with high prices and low availability[5] and also low-income populations' diets to be unbalanced and contain small quantities of FV.[6]

Types of food chosen and purchased by parents are essential to the development of healthy habits by children. Previous research demonstrated that food-shopping behaviors of mothers and children are similar[7] and that children of parents who buy more FV were more likely to try such foods.[8] Consequently, the choices at the time of purchase represent the beginning of the consumption chain in the family environment. Brazilian families of all income levels have been consuming increasing amounts of processed energy-dense nutrient-poor foods and insufficient amounts of FV in their natural form.[9]

The study's aim was to investigate how perceptions of price and availability of foods considered healthy are related to purchase behavior and FV intake in a group of individuals responsible for family grocery shopping.

METHODS

This was a cross-sectional, exploratory, descriptive quantitative study conducted in Florianópolis, the capital of Santa Catarina Province, in the southern region of Brazil. The study's protocol was approved by the Institutional Review Board at Federal University of Santa Catarina (Project 1140/10). Brazil

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has a population of over 200 million, 6 million of whom live in Santa Catarina.[10,11] In 2010, the year preceding data collection for this study, the province's Human Development Index was the third highest in Brazil (0.774) and the capital's index (0.847) was the third highest among Brazilian municipalities.[12] In the same year, Brazil's Human Development Index was 0.739.[13]

Subjects were adults who regularly shopped for family groceries and were parents of students enrolled in public municipal schools attended exclusively by primary school-aged children. Authorization from the municipal authority was obtained for all 10 existing schools. One school director did not agree to participate, so the final sample was composed of 9 schools geographically distributed throughout the city.

All 489 students, who were regularly enrolled in each of the 9 primary schools in 2011, were given invitation letters to give to their parents. To participate, children's parents (father or mother) had to live with the child, be responsible for grocery shopping for the family, and sign an informed consent form. Mean age of students was 9.2 years (± 1.01 year). More than half (56%) attended the morning period (Brazilian students go to school during either mornings or afternoons) and 52% were male. Students were evenly distributed among second-, third-, and fourth-year classes.

Based on teachers' previous experiences with research studies conducted at the schools, a 2-week deadline for the return of surveys was set for parents.

The self-administered survey was piloted with 8 parents (not included in the final sample) from 1 of the schools. It was adapted from previous studies[14,15] and contained open-ended and multiple choice questions addressed to parents and designed to gather data on demographic and socioeconomic variables, consumption of FV, and food-purchasing habits. Gender, age, marital status, number of children, education level of family's primary earner, and household monthly income were included in the survey's first section. In the second section, parents' consumption of fresh and cooked FV (not canned or frozen) was quantified in terms of weekly consumption of (1) fruits; (2) raw salads such as lettuce, tomato, and cucumber; and (3) cooked vegetables such as collards, carrot, chayote, eggplant, and zucchini, excluding potato or cassava.[14] Frequency categories ranged from 0 (never) to 7 (daily).[14] Based on the responses, 3 diet indicators were created: (1) regular intake of fruits (≥ 5 d/wk); (2) regular intake of vegetables (≥ 5 d/wk); and (3) regular intake of both fruits and vegetables, from the combination of the indicators (1) and (2).[14] The third section was composed of questions regarding the purchase of foods[15]: usual place for food shopping (supermarket/convenience store/produce market/farmers' market); criteria for selecting foods when shopping (quality/nutritional value/price/convenience/preference); examples of foods considered healthy (open-ended question); frequency of purchasing healthy foods for the family; frequency of considering healthy foods expensive; frequency of availability of healthy foods at usual shopping places (options: always/sometimes/seldom/never).[15] Examples of healthy foods mentioned by participants were categorized into food groups as determined by the Dietary Guidelines for the Brazilian Population: cereals; roots and tubers; dairy products; meats and eggs; FV; and beans and legumes.[2]

The researchers performed statistical analyses using STATA version 11.0 (Stata Corp, College Station, TX, 2009). Data were first descriptively analyzed in terms of absolute numbers and frequencies. To determine associations between independent and dependent variables, bivariate analyses were performed using chi-square tests. Tested associations were purchase frequency with regular intake of FV; perception of price with purchase frequency and regular consumption of FV; and perception of availability with purchase frequency and regular consumption of FV. $P < .05$ was considered significant.

RESULTS

Of the 489 individuals invited to answer the surveys, 216 (44%) returned the completed forms. One questionnaire was excluded because the respondent was not a child's parent. Table 1 describes participants' socioeconomic and demographic characteristics.

Table 1. Sociodemographic and Economic Variables of Parents Responsible for Purchasing Foods for Family, Florianópolis, Santa Catarina, Brazil, 2011 (n = 216)

Variable	n	%
Sex[a]		
Male	22	11.2
Female	175	88.8
Age, y[a]		
≥ 19–29	42	21.5
≥ 30–39	102	52.3
≥ 40–49	42	21.5
≥ 50	9	4.6
Marital status[a]		
Single	29	14.8
Married or with partner	142	72.4
Separated or divorced	25	12.8
Widow/widower	0	0.0
Number of children[b]		
1	72	34.4
2 or 3	114	54.5
≥ 4	23	11.0
Education level of family's primary earner, y[c]		
0–8	34	18.6
9–11	51	27.9
≥ 12	98	53.5
Monthly family income[a,d]		
≤ 2 MW	73	37.6
> 2–4 MW	85	43.8
> 4 MW	36	18.6

[a]Up to 10% missing data; [b]Up to 5% missing data; [c]Up to 15% missing data; [d]Minimum wage (MW) = R$510 in 2010, the equivalent of about US $900 or €800 monthly income.

The main place to shop for groceries was the supermarket (91.2%) and the main criteria for selecting foods at time of purchase were food quality (69.6%) and nutritional value (36.9%). Examples of healthy foods were mainly FV (93.4%), followed by milk and dairy products, meats, and eggs (43.2%).

Eighty percent of respondents mentioned *always* purchasing healthy foods for the family. About 85.6% of respondents considered healthy foods *always* or *sometimes* expensive. Fewer than 2% reported healthy foods as *seldom* or *never* available (Table 2).

Table 2. Variables Related to Consumption of Fruits and Vegetables (n = 214) and Purchase of Healthy Foods for Family (n = 216) as Reported by Parents in Charge of Purchasing Foods for Family, Florianópolis, Santa Catarina, Brazil, 2011

Variable	n	%
Regular consumption of fruit[a]		
No	111	51.9
Yes	103	48.1
Regular consumption of vegetables[b]		
No	85	39.7
Yes	129	60.3
Regular consumption of fruits and vegetables[c]		
No	141	65.9
Yes	73	34.1
How often (reported frequency) do parents purchase healthy foods for family?		
Always	172	80.0
Sometimes	41	19.1
Seldom	2	0.9
Never	0	0
How often are healthy foods considered expensive?		
Always	40	18.6
Sometimes	144	67.0
Seldom	19	8.8
Never	12	5.6
Availability of healthy foods at places where groceries are usually bought for family?		
Always	168	78.1
Sometimes	44	20.5
Seldom	3	1.4
Never	0	0

[a]Consumption of fruit: ≥ 5 d/wk; [b]Consumption of vegetables: ≥ 5 d/wk; [c]Consumption of fruits and vegetables: ≥ 5 d/wk.

Fewer than half of parents reported consuming fruits but more than half reported consuming vegetables ≥ 5 d/wk. Barely one-third of participants reported consuming a combination of FV in a frequency that could be classified as regular (Table 2).

The more frequent the reported purchase was of healthy foods, the higher was the prevalence of regular consumption of FV ($P = .002$) (Figure).

In terms of the associations between perception of price with frequency of purchase and prevalence of regular consumption of FV, results were not statistically significant ($P = .14$ and $P = .43$, respectively). Regarding the perception of availability of healthy foods in relation to the frequency of purchase of these foods and the prevalence of regular consumption of FV, no significant associations were found ($P = .72$ and $P = .41$, respectively).

DISCUSSION

This study sought to understand phenomena in a specific and noncontrolled context[16] rather than achieving sample representativeness. Mostly women (90%) completed the surveys, but that did not appear to be culturally determined because an international study found a similar proportion of female respondents.[17] Participants' mean age (35.7 ± 7.3 years) was consistent with national and state averages.[18] More than half of main family earners had ≥ 12 years of education (Brazilian average at the time of data collection was about 7 years).[13] More than 80% of families, however, reported earning up to 4 times the Brazilian minimum wage (R$510,00/mo in 2010). These reported monthly earnings were the equivalent of US $900 or €800 monthly income.

Supermarkets were the main facility where foods were purchased. The same result was found in a Brazilian study that employed systematic sampling.[19] Consumers seem to have changed the once-traditional preference for shopping at small stores and markets for the convenience of buying all food products needed in just 1 place, making shopping faster and easier.[20] Supermarkets can arguably be considered large suppliers of processed foods rich in fats, sugar, and salt.[21,22] However, they also offer healthy food choices.[22] Therefore, it is the consumer's responsibility to choose the foods to be taken home. In the current study, food quality and nutritional content were the main criteria used by parents when shopping. This was attributed to the high educational level of the families' main earners.[23,24]

Respondents mentioned cereals, roots, tubers, meats, eggs, beans, legumes, and FV as examples of healthy foods[2] and processed energy-dense and nutrient-poor foods were not mentioned even once. The outcome was as expected; it has been reported that most individuals can correctly identify which foods are healthier than others, even without understanding why.[25] Because of the sample's high educational level, being able to mention examples of healthy foods was not supposed to be a difficult task.

However, many obstacles hamper the task of consuming adequate amounts of FV. One is the individuals' belief that the diet is already healthy.[26] In the current sample, most respondents mentioned always purchasing healthy foods and cited FV as main examples of healthy foods. Consumption, however, seemed to contradict participants' claims about purchase behavior. Fruits and vegetables were reportedly consumed, but regular consumption of both (≥ 5 d/wk) was achieved by barely one-third of the sample. Therefore, the mentioned frequent acquisition of healthy foods did not lead to ingestion of the daily recommended quantities of FV. The same contradiction has been identified in population-based studies.[14,27-29] Ronteltap et al[30] argued that although health is an important value in consumer food choices, actual food choices often do not reflect this importance, and therefore there is a need to address this gap

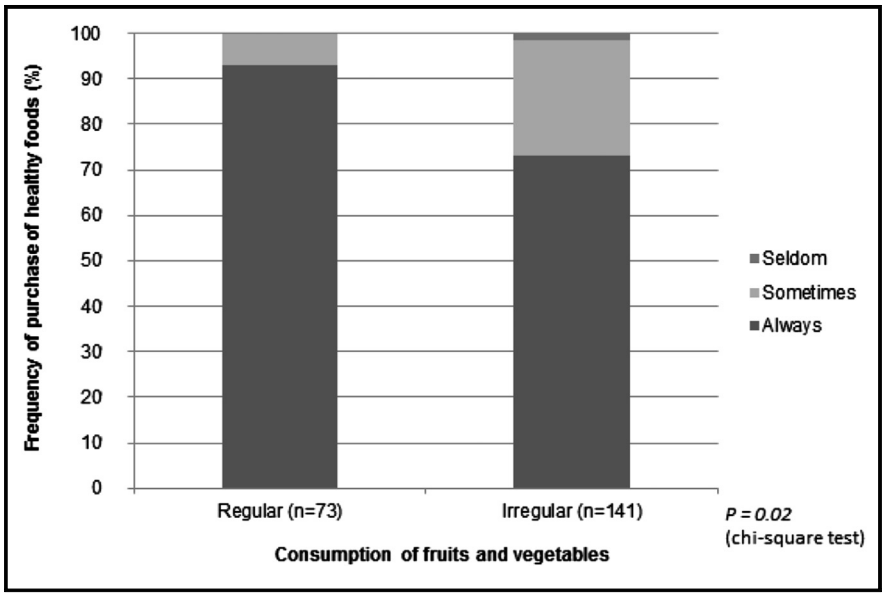

Figure. Prevalence of regular consumption of fruits and vegetables according to the frequency (reported) of purchase of healthy foods, Florianópolis, Santa Catarina, Brazil, 2011 (n = 214).

between perception and behavior. It could also be argued that the current study identified a situation in which people's perceptions of adequacy differ from established recommendations. Further research into this kind of discrepancy would be welcome, to contribute to the development of policy-making strategies.

Other causes of the discrepancy between food consumption and purchase could be that parents gave socially desirable responses (a limitation inherent in self-reported survey methods)[31]; that asking about food consumption and then about shopping behavior in the same survey biased the responses for whatever was asked second[31]; or that respondents who named foods other than FV as healthy purchased and ate those instead.

Parents have a key role in ensuring the availability of foods for their family, but providing healthy diets for the family is becoming increasingly challenging. The development of healthy eating habits requires the integration of key economic and regulating sectors, as well as social actors, to ensure food security and good nutrition.[2] Although supermarkets employ many strategies to increase the sales of processed foods, they do not apply the same strategies in produce sections. Distribution of free samples, free gift offers, and strategic product placement all distract the consumer from the task of choosing healthy foods. Making healthy food choices when shopping then becomes difficult or requires effort to resist the temptation of unhealthy food choices.[32]

IMPLICATIONS FOR RESEARCH AND PRACTICE

Respondents were knowledgeable about healthy foods and reported purchasing them frequently, and such purchase was associated with greater intake of FV. When analyzed according to guidelines, however, intake was not enough to achieve ideal parameters. This situation, in which what people perceive to be ideal is actually not, needs to be carefully addressed in further studies so that possibilities for improvement can be identified.

Strategies to boost the intake of FV by the population focus on incentives such as tax exemptions and credits for such foods[33] or on incentives to reduce consumption of processed energy-dense and nutrient-poor foods.[34] Strategies traditionally focused on consumers can actually become burdensome, putting all of the responsibility on their shoulders. Initiatives similar to the one proposed by the Global Strategy on Diet, Physical Activity, and Health,[35] which considers restaurants to be partners in promoting healthy foods, could be developed for supermarkets. Point of purchase education strategies such as supermarket and grocery store–based interventions have already proven to be effective, but unfortunately are still restricted to only a few countries.[36,37]

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REFERENCES

1. World Health Organization. Diet, Nutrition and Prevention of Chronic Disease. Geneva, Switzerland: WHO Technical Report; 2003. Series 916.
2. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Coordenação-Geral da Política de Alimentação e Nutrição. *Guia alimentar para a população brasileira: promovendo a alimentação saudável* [Feeding guide for the Brazilian population: promoting the health food]. Brasília; 2006, Série A - normas e manuais técnicos [Series A - norms and technical manuals].
3. European Food Information Council. The determinants of food choice. http://www.eufic.org/article/en/expid/review-food-choice/. Accessed October 1, 2014.
4. Butriss J, Stanner S, McKevith B, et al. *A Critical Review of the Psychosocial Basis of Food Choice and Identification of Tools to Effect Positive Food Choice: A Summary*. Summary of the main findings of the report commissioned by the Food Standards Agency. London, UK: British Nutrition Foundation; 2004.
5. McGee BB, Johnson GS, Yadrick MK, et al. Food shopping perceptions, behaviors, and ability to purchase healthful food items in the Lower Mississippi Delta. *J Nutr Educ Behav*. 2011;43:339-348.
6. De Irala-Estévez J, Groth M, Johansson L, Oltersdorf U, Prattala R,

Martínez-González MA. A systematic review of socio-economic differences in food habits in Europe: consumption of fruit and vegetables. *Eur J Clin Nutr*. 2000;54:706-714.
7. Epstein LH, Dearing KK, Handley EA, Roemmich JN, Paluch RA. Relationship of mother and child food purchases as a function of price: a pilot study. *Appetite*. 2006;47:115-118.
8. Busick DB, Brooks J, Pernecky S, Dawson R, Petzoldt J. Parent food purchases as a measure of exposure and preschool-aged children's willingness to identify and taste fruit and vegetables. *Appetite*. 2008;51:468-473.
9. Levy RB, Claro RM, Mondini L, Sichieri R, Monteiro CA. Regional and socioeconomic distribution of household food availability in Brazil, in 2008-2009. *Rev Saúde Pública*. 2012;46:6-15.
10. Brazilian Institute of Geography and Statistics. Database: countries. http://www.ibge.gov.br/paisesat/main_frameset.php. Accessed March 10, 2014.
11. Brazilian Institute of Geography and Statistics. Database: states. http://www.ibge.gov.br/estadosat/perfil.php?sigla=sc. Accessed March 10, 2014.
12. United Nations Development Program, Institute for Applied Economic Research, João Pinheiro Foundation. Atlas of Human Development in Brazil 2013: Ranking Brazil (2010) by municipalities/by states. http://www.atlasbrasil.org.br/2013/en/ranking. Accessed March 10, 2014.
13. United Nations Development Program. Human Development Reports: Brazil–Human Development Indicators. http://hdr.undp.org/en/countries/profiles/BRA. Accessed March 10, 2014.
14. Jaime PC, Figueiredo ICR, Moura EC, Malta DC. Factors associated with fruit and vegetable consumption in Brazil, 2006. *Rev Saúde Pública*. 2009;43:57-64.
15. Turner JJ, Kelly J, McKenna K. Food for thought: parents' perspectives of child influence. *Br Food J*. 2006;108:181-191.
16. Neutens J, Rubinson L. *Research Techniques for the Health Science*. 3rd ed. San Francisco, CA: Benjamin Cummings; 2002.
17. Dibsdall LA, Lambert N, Bobbin RF, Frewer LJ. Low-income consumers' attitudes and behaviour towards access, availability and motivation to eat fruit and vegetables. *Public Health Nutr*. 2003;6:159-168.
18. Brazilian Institute of Geography and Statistics. Census 2010—Characteristics of the population and households: results of the universe. http://www.ibge.gov.br/english/estatistica/populacao/censo2010/caracteristicas_da_populacao/default_caracteristicas_da_populacao.shtm. Accessed March 10, 2014.
19. Costa JC, Claro RM, Martins APB, Levy RB. Food purchasing sites: repercussions for healthy eating. *Appetite*. 2013;70:99-103.
20. Hawkes C. Dietary implications of supermarket development: a global perspective. *Dev Policy Rev*. 2008;26:657-692.
21. Popkin BM. Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases. *Am J Clin Nutr*. 2006;84:289-298.
22. Hutchinson PL, Bodor JN, Swalm CM, Rice JC, Rose D. Neighbourhood food environments and obesity in southeast Louisiana. *Health Place*. 2012;18:854-860.
23. Thiele S, Mensink GBM, Beitz R. Determinants of diet quality. *Public Health Nutr*. 2004;7:29-37.
24. Fernández-Alvira JM, Mouratidou T, Bammann K, et al. Parental education and frequency of food consumption in European children: the IDEFICS study. *Public Health Nutr*. 2012;16:487-498.
25. Lynch EB, Holmes S, Keim K, Koneman SA. Concepts of healthful food among low-income African American women. *J Nutr Educ Behav*. 2012;44:154-159.
26. Kearney JM, McElhone S. Perceived barriers in trying to eat healthier: results of a pan-EU consumer attitudinal survey. *Br J Nutr*. 1999;81:133-137.
27. Hall JN, Moore S, Harper SB, Lynch JW. Global variability in fruit and vegetable consumption. *Am J Prev Med*. 2009;36:402-409.
28. Blanck HM, Gillespie C, Kimmons JE, Seymour JD, Serdula MK. Trends in fruit and vegetable consumption among U.S. men and women, 1994-2005. *Prev Chronic Dis*. 2008;5:1-10.
29. Joffe M, Robertson A. The potential contribution of increased vegetable and fruit consumption to health gain in the European Union. *Public Health Nutr*. 2001;4:893-901.
30. Ronteltap A, Sijtsema SJ, Dagevos H, de Winter MA. Construal levels of healthy eating: exploring consumers' interpretation of health in the food context. *Appetite*. 2012;59:333-340.
31. Policy Studies Institute, Food Standards Agency. Attitudes and behaviours towards healthy eating and food safety: a scoping study. http://www.food.gov.uk/sites/default/files/multimedia/pdfs/foodandyouscoping.pdf. Accessed October 3, 2014.
32. O'Brien MC, McConnon A, Hollywood LE, et al. Let's talk about health: shoppers' discourse regarding health while food shopping. *Public Health Nutr*; 2014:1-10.
33. Kim SA, Blanck HM. State legislative efforts to support fruit and vegetable access, affordability, and availability, 2001 to 2009: a systematic examination of policies. *J Hunger Environ Nutr*. 2011;6:99-113.
34. Monteiro CA. Nutrition and health: the issue is not food, nor nutrients, so much as processing. *Public Health Nutr*. 2009;12:729-731.
35. World Health Organization. Global strategy on diet, physical activity and health. http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy_english_web.pdf. Accessed March 10, 2014.
36. Bangia D, Palmer-Keenan DM. Grocery store podcast about omega-3 fatty acids influences shopping behaviors: a pilot study. *J Nutr Educ Behav*; 2014;1-5.
37. Escaron AL, Meinen AM, Nitzke SA, Martinez-Donate AP. Supermarket and grocery store–based interventions to promote healthful food choices and eating practices: a systematic review. *Prev Chronic Dis*. 2013;10:120-156.

CONFLICT OF INTEREST

The authors have not stated any conflicts of interest.