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Gender Comparison of the Diet Quality and Sources of Food Purchases made by Urban Primary Household Food Purchasers

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Abstract

Objective: To compare food purchasing behaviors and diet quality of foods purchased between men and women who were the primary food purchaser for their households.

Methods: Food purchasing was measured via itemized receipts. The dietary composition of purchased foods was derived using the Nutrition Data System for Research (NDSR) and quality was assessed using the Healthy Eating Index-2010.

Results: Men comprised 17.2% of the household primary food purchasers in the sample (N = 204). There were no differences by gender in number of items purchased or number of receipts. Men made fewer of their purchases at stores (74.0%) than women (81.4%; $p < 0.001$). There were no gender differences in the quality of foods purchased overall or by source of purchase.

Conclusions and Implications: In primary 46 purchasers, purchasing behaviors varied by 47 gender but not purchases did not. Food purchasing interventions should include both genders for 48 greatest impact.

Keywords

Food purchasing; gender; quality; HEI-2010

Diet is an important modifiable risk factor for many chronic diseases ranging from cardiovascular disease to cancer.^{1,2} Eating behaviors are potentially modifiable, but are resistant to change. For example, interventions to promote fruit and vegetable consumption find increases during active intervention but regression after the intervention ends.^{3,4} To

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create sustainable behavioral effects, food purchasing has gained attention as a potential intervention point to improve diet quality because of the close relationship between food purchased and foods consumed.^{5,6}

Food purchasing patterns differ in important ways by income, education, neighborhood, and race⁷⁻⁹ but few studies have explicitly focused on gender. Women have been the focus of most food purchasing research because they are primarily responsible for household food purchasing¹⁰⁻¹² and preparation¹¹ and are seen as the “nutritional gatekeepers” of the home.¹³ However, recently, men have increased their involvement in food purchasing and food preparation.¹² It is therefore important to examine gender differences in food purchasing because of potential effects on household members’ dietary quality. Compared with women, men on average have lower nutrition knowledge¹⁴⁻¹⁶ and to emphasize convenience over quality of foods.¹⁷ For example, men report spending less time shopping, visiting fewer stores, doing less comparison shopping, and giving less consideration to nutrition than do women shoppers.¹⁸ However, it is unclear if these findings hold for actual foods purchased, as they have been studied exclusively via self-report.

The purpose of this study was to present a preliminary analysis that explores gender differences in food purchasing behaviors and the diet quality of foods purchased. These outcomes were determined from itemized food purchase receipts collected from individuals with primary responsibility for their household food purchasing in an urban setting. It was hypothesized that men would be more likely than women to shop at venues other than stores (e.g., purchases from restaurants) and would make food purchases that were lower in diet quality.

Methods

This study used data from a cross-sectional study investigating the role of behavioral and psychosocial factors on food purchasing.¹⁹ Briefly, adults residing in a large, Midwestern city who were responsible for the majority of food purchases for their household (i.e., >75% of purchases; one adult per household) were recruited to participate in the study in 2014–2016. Participants self-selected to participate in response to community advertisements (e.g., newspaper advertisements, flyers). In order to obtain a representative sample of primary food purchasers, no specific subgroups (e.g., low-income) were targeted for recruitment. Participants were ineligible if they lived outside city where the study was conducted, reported religious/spiritual or medical dietary restrictions, or major food allergies or sensitivities. The primary reasons for ineligibility for the study were lack of interest (26% of screened participants) or residing outside of the city (5%).¹⁹ The resulting sample is similar in terms of racial composition and income to the city where the study was conducted.²⁰ Participants were aware that this study focused on food purchasing patterns, but were not provided with any information about specific hypotheses. A more detailed description of the eligibility requirements and screening process have been published elsewhere.¹⁹ Written informed consent was obtained from all participants. Study procedures were approved by the Rush University Medical Center Institutional Review Board.

Measures

Demographic data were collected via self-report at baseline. Household size and reported income from all sources were used to compute the poverty index ratio for household size.²¹ Height and weight of the participants were measured in light street clothes using a SECA scale (model 876) and portable stadiometer (model 213).

Food purchase data were collected via itemized receipts. Participants were instructed to keep all itemized food purchase receipts and to record detailed information about who made the purchase, where it was made, and the items and quantities purchased. All household food purchase receipts made during the study window (14-days) were included. To encourage adherence to the protocol and to minimize social desirability reactivity, participants were read a script that emphasized that their data would be de-identified and it would not be possible to determine which foods were purchased for or consumed by any given individual in the household. Research assistants visited the participants' homes four times during the 14-day study window to collect the receipts and document the food purchase nutrition information by photographing food package labels (when available) or taking detailed notes to provide adequate information to match the foods purchased with foods in the National Data System for Research (NDSR; versions 2013–2015, Nutrition Coordinating Center, University of Minnesota, MN).²² Sources of food purchases were recorded by participants following a defined protocol. Categories included: 1) stores (e.g., grocery stores, corner stores, discount centers), 2) fast-food/carryout (e.g., counter-service restaurants, food purchased at restaurants to be consumed at home), 3) restaurants (e.g., full-service restaurants, bars, cafeterias), and 4) other (e.g., mail order).

The NDSR software program was used to calculate specific nutrients for each food purchased. Information collected during the home visit (i.e., photographs and field notes) were used to ensure that the proper foods were identified in the food database. Diet quality was then computed from the NDSR nutrition data according to the Healthy Eating Index-2010 (HEI-2010) coring.²³ As described elsewhere, the HEI-2010 total score is an index that assesses adherence to the USDA Food Guide Pyramid guidelines and provides an estimate of the overall quality of the diet consumed.²⁴ Although the HEI was initially developed using individual dietary intake data,²⁵ HEI-2010 scores for food purchases are highly correlated with multi-pass dietary intake recalls and were unrelated to social desirability scores.¹⁹

Analysis

Data analysis for this study was conducted using SAS 9.4 (SAS Institute, Cary, NC).²⁶ Of the 12,690 food items purchased, 1592 (12.6%) items were purchased by someone other than the primary food purchaser and 229 (1.8%) items were purchased by more than one person and were excluded from this analysis. Bivariate comparisons for demographic variables were made using t-tests, Mann-Whitney tests, and chi-squared independence tests. Gender comparisons of food purchasing variables (number of receipts, total items purchases, and items per receipt) were conducted using general linear modeling assuming negative binomial distributions. Gender comparisons for the source of food purchases were examined

using a multinomial logistic regression. Gender differences in diet quality of food purchases were tested using linear regression. Analyses were adjusted for number of children present in the home because number of children in the home differed by gender and by household poverty income ratio.⁹ Significance was set at $p < 0.05$ for all analyses.

Results

Of the primary food purchasers recruited for this study, 17% were men ($n = 34$). Women and men did not differ on demographic or household characteristics, with the exception of a trend for more children in households with female primary shoppers (Table 1; $p = 0.05$).

There were no gender differences in the number of food receipts (Women: $M \pm SD$ 10.0 \pm 7.3; Men: 10.4 \pm 6.9; rate ratio (RR) = 0.94, 95% confidence interval: 0.74, 1.20) or number of food items purchased (W: 56.0 \pm 33.1; M: 43 \pm 26.6; RR = 1.20, 95% CI: 0.95, 1.51). The number of food items purchased per receipt was greater among women (5.6 \pm 7.8) than men (4.1 \pm 5.3; RR = 1.28, 95% CI 1.13, 1.44). The Figure shows that the source of items purchased varied by gender in both unadjusted analyses ($\chi^2 = 44.84$, $p < 0.01$) and when controlling for the number of children in the household and poverty income ratio (Wald $\chi^2 = 30.94$, $p < 0.01$). Men were more likely than women to purchase items from sources other than stores.

Despite differences in food sources, there were no significant effect of gender in the diet quality of all foods purchased in linear regression models ($b = 0.08$; $p = 0.98$; Table 2). There were also no gender differences in the HEI-2010 total score of foods purchased by source of purchase (Table 2).

Discussion

In this preliminary analysis, men and women who are primary household food purchasers in this study had similar purchasing patterns in terms of number receipts collected, and total of items purchased and quality of the foods purchased. However, men were less likely than women to shop in stores (including grocery stores, corner stores, etc.) for their food purchases and instead were more like to make purchases from restaurants, carryout, and fast-food establishments, or other venues. These latter food sources generally have less healthy options than stores in both the current study¹⁹ and in previous studies.^{27,28} Surprisingly, despite men's greater reliance on restaurants, carryout, and fast-food sources, diet quality of purchases did not differ between men and women.

This study is consistent with a prior research study focused on primary food purchasers. In both the current study, which used food purchase receipts from all food sources, and in a prior study, which focused only on grocery store purchases,⁷ there were no differences between men and women's purchases in either the diet quality of purchases or the types of foods purchased. The lower nutrition knowledge and reported shopping preferences observed among men in prior studies^{14,18,29} may not apply to the subset of men who are responsible for the household's food purchases. Men who identify as the primary food purchaser for their household are in the minority of all primary purchasers (17% in the current study, 18–19% in prior studies)^{5,7,19} and these men may have greater nutrition

knowledge and different priorities for food purchasing than men more generally. Additionally, men who are interested in participating in studies focused on food purchasing may differ as well. These interpretations will need to be examined in future studies.

In this sample, men purchased more items from restaurants/bars and fast-food/carryout sources than women. Men have previously reported shopping from less healthy food stores more often than women²⁹ and to prioritize ease of shopping over nutrition¹⁸ although these prior studies relied on self-reported shopping habits. Despite making purchases that were similarly healthy at these alternative venues to women in this study, by purchasing foods at places other than stores, men are exposing themselves to more unhealthy food options and may not always purchase foods with the same quality as those purchased during the study period. Encouraging all primary shoppers (both men and women) to rely on grocery stores may lead to greater improvements in the diet quality of food purchases.

This study is notable because it is one of the first to systematically compare men and women as primary food purchasers using objective measures of food purchases from all sources. The inclusion of men in research on food purchasing behaviors will provide a more comprehensive understanding of the role that food purchasing plays in relationship to eating behaviors and dietary intake. This study used a rigorous receipt collection protocol to include purchases from all sources, expanding the scope beyond focusing on stores or restaurants alone or relying on self-reported purchasing behavior. Further, by collecting itemized receipts, this analysis was also able to calculate the overall diet quality of the purchases using NDSR. Finally, though the sample was predominately female, the sample contained significant income and racial diversity which will enhance the generalizability of the study results. However, there are several notable limitations to consider. First this study used a relatively small, self-selected sample that contained a small number of men. These men were not matched to women on all household characteristics, especially considering the presence of children. The small sample of men, though proportional to other samples of primary food purchasers,^{5,7} may have limited our power to detect differences between men and women. Future studies with larger samples will be needed to replicate the current results. This study also focused only on primary food purchasers therefore future studies will need to explore gender differences among other types of purchasers. It is noted that participants were aware that receipts were being collected and may have changed their food purchasing behavior in response to the researchers' observation, though steps were taken to minimize this and the dietary quality of purchases was unrelated to measures of social desirability.¹⁹ In the classification of purchase sources, all stores were classified together (supermarkets versus corner stores), potentially obscuring gender differences in purchasing from these food sources. Finally, because of the detailed data collection protocol, receipts were recorded for a short period (14 days) which allows for characterization of purchasing^{9,30} but may not capture changes or temporal patterns in purchasing behavior.

Implications for Research and Practice

Food purchasing behavior remains an understudied area of eating behavior and differences in purchase patterns by gender have received little attention. Moving forward, it will be important to continue to include more men in food purchasing studies and interventions,

including men who are not primarily responsible for food purchases but instead share the responsibility. Nutrition educators can apply these findings by querying clients about who is responsible for their household's food purchases and therefore where purchases are being made. Based on the present observations, both men and women should be included in educational efforts to improve the quality of household food purchases.

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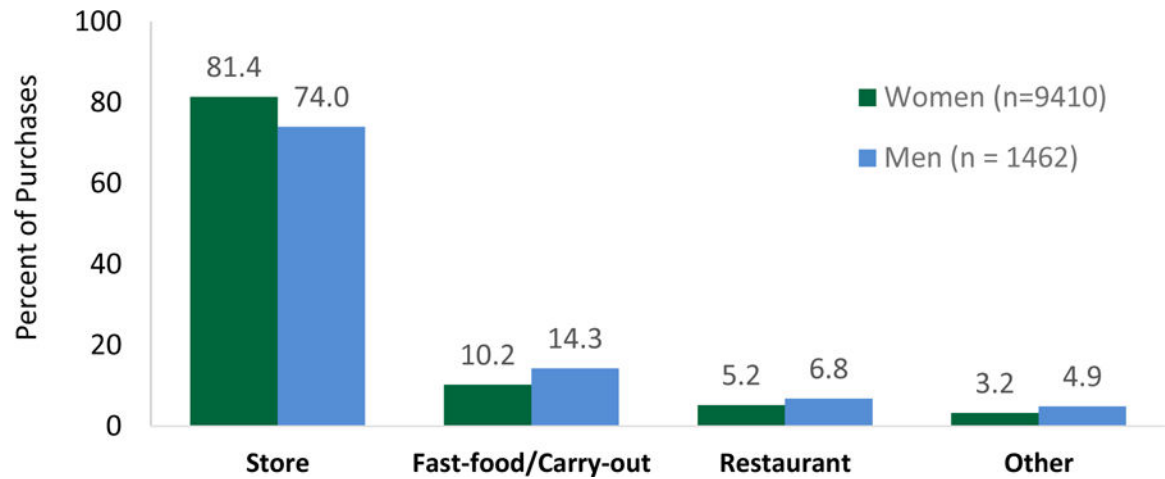


Figure.

Source of purchases by gender of primary food purchaser

Note. Source of purchases include: stores (e.g., grocery stores, corner stores, discount centers); fast-food/carryout (e.g., counter-service restaurants, food purchased at restaurants to be consumed at home); restaurants (e.g., full-service restaurants, bars, cafeterias); and other (e.g., mail order, purchased from individual). Statistical significant effects for gender were tested in a multinomial regression (Wald $\chi^2 = 30.94$, $p < 0.01$).

Table 1.

Demographic characteristics of primary food purchaser by gender

	Total	Women	Men
	N = 202	n = 168	n = 34
Age, years (M ± SD)	44.1 ± 13.3	44.4 ± 13.7	42.5 ± 11.2
Weight, kg (M ± SD)	84.3 ± 26.1	82.6 ± 25.8 [*]	92.6 ± 26.8 [*]
BMI, kg/m ² (M ± SD)	31.2 ± 9.1	31.3 ± 9.3	30.6 ± 8.4
Number of Household Members (median; range)			
Adults	2 (1–4)	2 (1–4)	1 (1–4)
Children	0 (0–6)	0 (0–6) [†]	0 (0–2) [†]
Ethnicity/Race, N (%)			
African-American	99 (45.6%)	80 (47.3)	13 (37.1)
Hispanic/Latino	12 (5.9)	11 (6.5)	1 (2.9)
Multi-ethnic/Other	38 (18.6)	26 (15.4)	12 (34.3)
Non-Hispanic white	61 (29.9)	53 (30.8)	9 (25.7)
Annual Household Income, dollars (median; interquartile range)	48,000 (24000; 75000)	45,000 (25000; 75000)	50,000 (17000; 65000)
Poverty Index Ratio, N (%)			
0.00–1.99	76 (37.6)	65 (38.7)	11 (32.4)
2.00–3.99	60 (29.7)	47 (28.0)	13 (38.2)
4.00–5.99	31 (15.4)	25 (14.9)	6 (17.7)
6.00	36 (17.3)	31 (18.5)	4 (11.4)
Government Food Assistance	82 (40.6)	70 (41.7)	12 (35.3)
Employment, N (%)			
Full-time	87 (43.1)	72 (42.9)	15 (44.1)
Part-time (<35 hours/week)	40 (19.8)	32 (19.1)	8 (23.5)
Unemployed	45 (22.3)	38 (22.6)	7 (20.6)
Disability/Retired	30 (14.9)	26 (15.5)	4 (11.8)
Education, N (%)			
High school education/some college	93 (46.0)	73 (43.5)	20 (58.8)
College degree or greater	109 (54.0)	95 (56.6)	14 (41.2)
Marital Status, N (%)			
Married/living with partner	85 (42.1)	73 (43.5)	12 (35.3)
Never/ previously married	117 (57.9)	95 (56.6)	22 (64.7)

Note. Continuous variables were tested using independent t-tests, number of children were tested using Mann-Whitney U-tests, and categorical variable were tested using chi-squared tests.

^{*} p < 0.05

[†] p = 0.05

Table 2.

Gender comparison of food purchasing behaviors

	Women	Men	b (se)	p-value ^a
HEI Component Scores^b	n = 168	n=34		
Total fruit (Range 0–5)	2.3 ± 1.8	2.4 ± 2.0	–0.17 (0.33)	0.61
Whole fruit (Range 0–5)	2.7 ± 2.0	2.6 ± 2.0	0.09 (0.36)	0.80
Total vegetables (Range 0–5)	2.8 ± 1.6	3.2 ± 1.5	–0.32 (0.29)	0.27
Greens and beans (Range 0–5)	2.4 ± 2.1	3.1 ± 2.1	–0.61 (0.39)	0.12
Whole grains (Range 0–10)	4.5 ± 3.7	3.1 ± 3.1	1.32 (0.68)	0.05
Dairy (Range 0–10)	5.2 ± 3.1	5.5 ± 3.2	–0.21 (0.60)	0.73
Total protein (Range 0–5)	4.1 ± 1.3	4.2 ± 1.3	–0.08 (0.25)	0.76
Seafood and plant protein (Range 0–5)	2.6 ± 2.1	3.2 ± 2.1	–0.52 (0.38)	0.18
Fatty acids (Range 0–10)	5.0 ± 3.5	5.4 ± 3.8	–0.24 (0.67)	0.72
Refined grains (Range 0–10)	7.2 ± 3.1	6.3 ± 4.2	1.05 (0.62)	0.10
Sodium (Range 0–10)	6.1 ± 3.9	5.2 ± 4.1	0.98 (0.74)	0.19
Empty calories (Range 0–20)	14.4 ± 5.1	15.9 ± 4.7	–1.20 (0.94)	0.20
HEI-2010 Total Score (Range 0–100)				
All purchases	59.5 ± 16.0	59.9 ± 16.0	0.08 (2.6)	0.98
By purchase location				
Store	n = 165 58.2 ± 17.4	n = 33 57.4 ± 18.4	1.32 (3.22)	0.68
Fast-food/carryout	n = 122 46.8 ± 12.5	n = 26 43.7 ± 9.5	3.37 (2.65)	0.21
Restaurant/ bar	n = 67 47.8 ± 13.4	n = 18 51.6 ± 13.6	–4.60 (3.46)	0.19
Other	n = 23 50.8 ± 17.3	n = 6 49.3 ± 19.6	–2.29 (7.03)	0.75

^aP-values are for the slope for gender from linear regression models adjusted for number of children in household and poverty index ratio.

^bValues are HEI-2010 Component Scores. Ranges shown are the possible scores and values are calculated means and standard deviations. Components are scored based on conformance to USDA dietary guidelines with a greater scores indicating greater compliance to guidelines. See Reference 23 for scoring details.