Trends in U.S. Wheat-based Food Consumption: Nutrition, Convenience, and Ethnic Foods

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This study identifies U.S. consumers' use of food nutrition labels on wheat-based foods; consumer attitudes toward the importance of taste, price, and nutrition in choosing wheat-based snack foods; and consumer knowledge of Middle-Eastern wheat-based foods. A survey of U.S. primary grocery shoppers indicated that most respondents believed it was important that their diets contained wheat-based food products. A majority of respondents indicated that fat content was the most important item on food nutrition labels when making a wheat-based food purchase decision. A majority of respondents indicated that taste was the most important factor when making wheat-based snack food purchases. Most respondents were not familiar with Middle-Eastern wheat-based foods.

Introduction

Nutrition concerns, increasing demand for convenience, and increasing acceptance of ethnic foods have been identified as trends that are significantly influencing U.S. food consumption (Chou, 1994; Fusaro, 1994; Henneberry and Charlet, 1992; Senauer, Asp, and Kinsey, 1991). These trends are the product of changing consumer habits and socioeconomic factors. The consumption of low-fat, high fiber diets has been particularly advocated by health and nutrition agencies (Wheat Foods Council, 1996). In response to such efforts, U.S. per capita wheat consumption has increased since the early 1970s. Per capita wheat consumption in 1970 and 1993 was approximately 150 pounds and 200 pounds, respectively (USDA, 1996).

Increasingly, wheat producers and food processors are seeking value-added, niche-market opportunities for wheat-based food products (Brester, Biere, and Armbrister, 1996; *Kansas Farmer*, 1997); however, the success of such ventures hinges critically on the identification of consumer market segments because of differences that exist among various demographic segments of the population (Cortez and Senauer, 1996; Skaggs et al., 1987). In addition, the diets of those in different segments are changing in different ways (Senauer, Asp, and Kinsey, 1991). Thus, the objectives of this study are as follows: (1) to identify relationships between wheat-based food consumption and consumer attitudes toward nutrition; (2) to evaluate consumer attitudes toward convenient wheat-based snack foods; and (3) to determine consumer awareness of wheat-based, Middle-Eastern ethnic foods. Such information is useful to agricultural producers, food processors, and retailers for the identification of value-added market niches. In addition, given that food nutrition education efforts currently focus on emphasizing the value of reduced fat and increased fiber consumption, food policymakers need to consider the socioeconomic characteristics of consumers possessing disparate attitudes toward these issues.

Background and Previous Research

Government agencies, such as the U.S. Department of Agriculture (USDA) and the Food and Drug Administration (FDA), are increasingly involved in augmenting consumer nutritional awareness. For example, the USDA's 1995 dietary guidelines recommend a diet weighted heavily toward grain products because they provide beneficial carbohydrates and are, in general, low in dietary fat (USDA, 1995). The 1990 U.S. Nutritional Labeling and Education Act (NLEA) is a recent attempt to provide consumers with accurate and consistent nutrition information regarding food purchases. In 1994, the Act made the FDA responsible for implementing mandatory nutrition labeling on all processed foods (Hegarty, 1995; Frazao, 1994; McNamara, 1994). These dietary guidelines, policies, communication, and education programs are increasingly used by food processors as marketing tools (Fuller, 1994). In addition, health organizations (for example, American Dietetic Association, National Cancer Institute, National Academy of Sciences) and the Wheat Foods Council's education and

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communication programs stress the nutritional value of grain products and whole-grain products in diets (Frazao, 1994; Fusaro, 1994; Jacobson, 1994). Previous studies have evaluated food shoppers' attitudes toward, and knowledge of, nutrition and health issues (Wheat Foods Council, 1995; American Dietetic Association, 1993; *Food Marketing Institute and Prevention Magazine*, 1993). Nayga (1996) reported that well-educated female meal planners were more likely to use a variety of nutrition information printed on food packages. In addition, household size, race, employment status, urbanization, region of residence, age, and income influenced consumer attitudes regarding the importance of nutrition in food shopping. Previous studies have also considered attitudes and behavior toward pre-1994 nutrition labeling information (*Food Marketing Institute and Prevention Magazine*, 1993) and the 1994 NLEA (Nayga, 1996); however, attitudes regarding nutrition labeling of wheat-based foods have not been studied. Because wheat-based food products are generally considered healthy, attitudes, regarding the labeling of these products may differ from those regarding the labeling of other food products.

Increased female participation in the work force has increased the demand for convenience foods (Chou, 1994). Snacking is now considered an "American passion" and "the epitome of the portable society on the go: fast, fun, easy, and cheap" (Hollingsworth, 1995). Furthermore, a growing trend for "healthier" snack foods is shaping the snack-food industry (Schultz, 1995). Curtis, Granzin, and Olsen (1996) have characterized the market for snack products in terms of consumers' attitudes regarding their health and nutrition-oriented lifestyles.

An increasing acceptance of ethnic wheat-based food products in American diets is also shaping U.S. food consumption. Fuller (1994) discusses the development of ethnic food products as a potential growth area for the food industry. Mexican, Italian, and Chinese cuisines each use wheat-based food products (for example, tortillas, breads, and pastas) as primary ingredients and represent ethnic foods that have been widely adopted by U.S. consumers. Qaaroni, Ponte, and Posner (1992) reported that the consumption of ethnic foods and various types of ethnic flat breads is increasing in the United States because these products have many appealing characteristics (for example, as sources of dietary fiber and complements to other food products). Health

agencies recommend the inclusion of ethnic foods as healthy alternatives to commonly consumed U.S. foods (National Center for Nutrition and Dietetics, 1995; USDA, 1995; *Food Marketing Institute and Prevention Magazine*, 1993). The development and adoption of additional ethnic food products may provide opportunities for increasing the consumption of wheat-based food products, especially those used in Middle-Eastern breads and dishes (Packard and McWilliams, 1993; Qaaroni, Ponte, and Posner, 1992). Many Middle-Eastern cuisines are based on wheat-based products, including pita bread, bulgur, couscous, and tabouli.[1] No publicly available study has assessed the characteristics of these markets and provided directions for their development.

Survey Design and Data Collection

Data were collected using a national survey of 2,500 U.S. household primary grocery shoppers. These individuals primarily influence household food purchases and consumption. A random sample was provided under contract by a private company (Metro Mail Inc.), which maintains addresses of 5 million U.S. households that are representative of the U.S. population in terms of gender, race, number of household members, income, and regional factors.

A two-step approach was used for the administration of the survey. Following Richardson (1994) and Churchill (1992), postcards were initially sent to each potential respondent in October 1995. The postcards indicated the purpose of the study and informed each individual that a questionnaire would shortly be delivered. Three days later a questionnaire was sent to each potential respondent along with a cover letter, which explained that a free cookbook would be sent in exchange for the return of a completed questionnaire.[2] A postage-paid envelope was included with each questionnaire. A total of 552 questionnaires were returned, which represented a 22.1 percent response rate.

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[1]Pita bread is a flat bread that, when opened, forms a pocket and is used as a substitute for bread in sandwiches. Bulgur is a partially cooked and subsequently dried cracked wheat whose use is similar to that of rice. Couscous is a granular semolina product often consumed with vegetable and meat sauces. Tabouli is a fresh vegetarian salad based on soaked bulgur.

[2]Cookbooks were provided by the Kansas Wheat Commission (1995 Kansas Wheat Commission Recipes Cookbook) and contained recipes for preparing wheat-based food items.

Respondents were asked questions regarding their consumption of wheat-based foods in the two weeks preceding the receipt of the questionnaire. The questionnaire consisted of four general sections: (1) types of wheat-based food consumed, attitudes toward wheat-based foods, and importance of nutrition information in choosing wheat-based foods; (2) attitudes and behavior toward wheat-based snack foods; (3) attitudes, behavior, and awareness of wheat-based ethnic foods; and (4) socioeconomic characteristics.[3] The questions in the first section were designed to elicit respondents' use and opinion of wheat-based food products. In addition, each respondent was presented a standard nutrition label and asked to indicate the nutrition item that they considered most important. The questions in the second section were related to the relative importance of taste, price, and nutrition in the purchase of wheat-based snack-food products. In the third section, respondents were asked to indicate their familiarity with four Middle-Eastern wheat-based foods (pita bread, bulgur, tabouli, and couscous). The fourth section was used to obtain socioeconomic data, including gender, age, education, employment status, size of household, number of children, ethnic or racial heritage, urban/rural/suburban residence, region of residence, and annual household income.

Characteristics of the Sample

Sixty-eight of the returned questionnaires were discarded either because respondents failed to provide information regarding their socioeconomic characteristics or because the questionnaire was completed by someone other than a primary grocery shopper. The socioeconomic characteristics of the remaining 484 survey respondents were compared to those of all U.S. residents based on 1995 U.S. Bureau of Census data (1996). Although our sample consisted of primary grocery shoppers, Table 1 illustrates that the distribution of the socioeconomic characteristics of our sample is similar to the distribution of the socioeconomic characteristics of the entire U.S. population; however, our sample is slightly skewed toward Caucasians/non-Hispanics, those with college educations, and

households with annual incomes greater than $50,000.[4]

A majority of respondents (68.4 percent) were female, and the average age of all respondents was 47. Given that more than 82 percent of respondents indicated that it was either "very important" or "important" that their diets contain wheat-based foods, it appears that primary grocery shoppers believe that wheat-based foods provide a healthy component to diets.

Consumer Characteristics and the Use of Nutrition Labels on Wheat-based Foods

The first objective of this study was to identify socioeconomic characteristics that affect the use of nutrition labels on wheat-based food products. The survey presented respondents with an exact replica of an NLEA food nutrition label. Respondents were asked to indicate the item on the nutrition label that they consider most important when purchasing wheat-based foods. Respondents could have selected any of 21 informational items as being most important. We have categorized these items into the following five groups: (1) sodium and other items (for example, vitamins, percentages of daily recommendations); (2) calories (includes calories from fat); (3) fat (includes all types of fat); (4) cholesterol; and (5) dietary fiber.

Respondents were sorted into these five groups based upon the nutrition category that was most important to them. Ninety-two respondents (19 percent) selected items in two or more of these categories. Thus, the following analysis uses the remaining 392 observations.[5] The first group is comprised of 66 respondents (16.9 percent) who considered sodium and other items to be most important. The second group is comprised of 61 respondents (15.5 percent) who considered calories to be most important. The third group is the largest and

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[3]A copy of the questionnaire is available from the authors upon request.

[4]Better-educated and wealthier consumers are more likely to be concerned about food nutrition and convenience issues (and to participate in surveys). Nonetheless, the extension of our empirical results to the entire U.S. population must consider the skew of our sample in terms of ethnicity, income, and education.

[5]The unusable questionnaires for this model (and those in the following sections) appeared to be randomly distributed in that their deletion did not appreciably alter the composition of our sample.

Table 1. Socioeconomic Characteristics of Survey Respondents and 1995 U.S. Resident Population.

Characteristic	Sample	1995 U.S. Resident Population
	----------percent-----------	
Education[a]		
No college	24.2	52.2
College	75.8	47.8
Employment status[b]		
Employed full-time	58.4	59.2
Homemaker	11.6	—
Retired	18.4	—
Part-time employed, unemployed, full-time student, Other	11.6	—
Not in labor force/Unemployed (includes part-time workers in the sample)	41.6	40.8
Presence of children in households[c]		
No child	58.5	64.6
One or more children	41.5	35.4
Ethnic or racial background[d]		
Caucasian non-Hispanic	83.9	73.7
Hispanic, African American, Asian American, Native American, other	16.1	26.3
Residence[e]		
Rural (less than 1,000 inhabitants in the sample)	21.3	24.8
Suburban (between 1,000 residents and 60,000 inhabitants in the sample)	39.4	75.2
Urban (more than 60,000 inhabitants in the sample)	39.3	
Region		
Northeast	23.1	19.6
Midwest	30.0	23.5
South	31.6	35.0
West	15.3	21.9
Annual household income[f]		
Under $20,000	15.7	22.6
Between $20,000 and $50,000	41.5	47.2
Above $50,000	42.8	30.2

[a] 1994–1995 Census data for people 25 years old and over.

[b] Census data considers civilian, noninstitutional population 16 years old and over.

[c] Census data considers family households. The term "family" refers to a group of two or more persons related by birth, marriage, or adoption and residing together in a household.

[d] 1990 Census data.

[e] According to the 1990 Census definition, the urban population comprises all persons living in (a) places with 2,500 or more inhabitants that are incorporated as cities, villages, and boroughs but excluding persons living in the rural portion of extended cities (places with low population density in one or more large parts of their area); (b) Census-designated places with 2,500 or more inhabitants; and (c) other territory, incorporated or unincorporated, included in urbanized areas. An urbanized area comprises one or more places and adjacent densely settled surrounding territory that together consist of a minimum of 50,000 persons.

[f] For comparison, Census data income brackets are (a) lower than $15,000; (b) between $15,000 and $50,000; and (c) higher than $50,000.

is comprised of 219 respondents (55.9 percent) who considered fat information to be most important. The fourth and fifth groups are the smallest and are both comprised of 23 respondents (5.9 percent) who considered cholesterol and dietary fiber, respectively, to be most important.

A multinomial logit model is used to identify and compare the socioeconomic characteristics of the five groups of respondents. The dependent variable for each of the five choices is given a value of one if a respondent selected that item as most important, and a value of zero otherwise. The multinomial logit model for the J groups is represented by

(1)
$$Prob(Y_i = j) = \frac{e^{\alpha_j X_i}}{(\sum_{k=1}^{J} e^{\alpha_k X_i})}$$

$$j = 1, 2, ..., J; \text{ and } \alpha_1 = \{0\},$$

where $Prob(Y_i=j)$ denotes the probability that the ith respondent considered the jth item to be most important, X_i is a vector of socioeconomic characteristics (including a constant) for the ith respondent, and a_j is a vector of unknown parameters to be estimated. The socioeconomic characteristics specified in X are presented in Table 2. For the socioeconomic variables, only age is a continuous variable. (The others are binary.) The model implicitly uses a working woman with some college education and no children as a standard. The standard female resides in a Southern suburban area and has an average income between $20,000 and $50,000.

Parameter estimates of the multinomial logit model represent the relative movement between a choice outcome and a reference outcome. Equation (1) is estimated after setting the parameter vector for "sodium and other items" (α_1) equal to {0} (Greene, 1993). The multinomial logit model (equation 1) was estimated using TSP 4.3, and parameter estimates are presented in Table 3.

Parameter estimates of equation (1) are used to calculate marginal probabilities for each group (that is, the change in the probability of selecting the jth item as most important with respect to a one-unit change in each independent variable) including the reference group. The marginal probabilities are calculated as

(2)
$$\frac{\partial Prob(Y_i = j)}{\partial X_m} = [Prob(Y_i = j)] *$$

$$[\alpha_{jm} - \sum_{k=1}^{J} (Prob(Y_i = k)) \alpha_{km}] \quad \begin{array}{l} j = 1, 2, ..., J \\ m = 1, 2, ..., 16, \end{array}$$

where X_m denotes the mth characteristic and α_{jm} is the parameter estimate (from equation 1) associated with the mth socioeconomic characteristic for $Prob(Y_i=j)$.

The marginal probabilities (and their standard errors)Cof considering either sodium and other items, calories, fat, cholesterol, or dietary fiber to be the most important information contained on nutrition labels, given a one unit change in each independent variableCare presented in Table 4. All probabilities are computed at the means of the independent variables. If a respondent has an ethnic/racial heritage, the probability of considering sodium and other items or calories as most important increases by 0.10 and 0.11, respectively. The probability that respondents with annual household incomes less than $20,000 consider calories to be most important increases by 0.11 whereas the probability that respondents consider fat to be most important decreases by 0.26 relative to those with annual household incomes between $20,000 and $50,000. The probability of considering cholesterol information to be most important decreases by 0.05 if the respondent has an ethnic/racial heritage. The probability of considering cholesterol information to be most important increases by 0.08, 0.05, and 0.04 if a respondent is retired, a part-time employed/unemployed/full-time student, or has children in his/her household, respectively. The probability of considering dietary fiber to be most important increases by 0.001 for each year of age in excess of 46.

Consumer Characteristics and the Use of Convenient Wheat-based Foods

The second objective of this study was to conduct baseline measurements of consumer attitudes toward convenient wheat-based foods. Respondents were asked to rank taste, price, and nutrition in their relative order of importance when purchasing wheat-based snack foods. Eighty-one respondents (16.7 percent) did not complete this question. The remaining 403 respondents were separated into three groups according to the factor (that is, taste, price, or nutrition) considered most important when purchasing snack foods. The first group, which is the largest, is comprised of 217 respondents (53.8 percent) who ranked taste as most important. The second group, which is the smallest, is comprised of 46 respondents (11.4 percent) who ranked price as most important. The third group is comprised of 140 respondents

Table 2. Description of the Independent Variables.

Variable	Description
Male	1 if primary grocery shopper is male; 0 otherwise
Age	Age of respondent in years
LessEduc	1 if level of education of primary grocery shopper is less than college; 0 otherwise
Home	1 if primary grocery shopper is homemaker; 0 otherwise
Retired	1 if primary grocery shopper is retired; 0 otherwise
Unemp	1 if primary grocery shopper is unemployed, working part-time, or is a full-time student; 0 otherwise
Child	1 if primary grocery shopper has children in his/her household; 0 otherwise
Ethnic	1 if primary grocery shopper is non-Caucasian/non-Hispanic; 0 otherwise
Rural	1 if primary grocery shopper is living in a rural area (less than 1,000 inhabitants); 0 otherwise
Metro	1 if primary grocery shopper is living in a metropolitan area (more than 60,000 inhabitants); 0 otherwise
Northeast	1 if primary grocery shopper is living in the Northeast; 0 otherwise
Midwest	1 if primary grocery shopper is living in the Midwest; 0 otherwise
West	1 if primary grocery shopper is living in the West; 0 otherwise
LowInc	1 if primary grocery shopper's annual household income is less than $20,000; 0 otherwise
HighInc	1 if primary grocery shopper's annual household income is greater than $50,000; 0 otherwise

Table 3. Parameter Estimates of the Multinomial Logit Model Identifying the Most Important Information on Nutrition Labels Relative to Sodium and Other Items.

Independent Variable	Dependent Variable			
	Calories Prob(Y=2)	Fat Prob(Y=3)	Cholesterol Prob(Y=4)	Dietary Fiber Prob(Y=5)
Intercept	1.219 (0.938)	2.170*** (0.822)	-1.872 (1.792)	-2.305 (1.537)
Male	-0.450 (0.408)	-0.151 (0.314)	0.098 (0.572)	-0.027 (0.580)
Age	-0.018 (0.017)	-0.010 (0.015)	-0.013 (0.024)	0.026 (0.023)
LessEduc	-0.419 (0.500)	-0.001 (0.383)	0.641 (0.649)	-0.882 (0.598)
Home	0.330 (0.707)	0.924 (0.605)	0.239 (1.338)	1.177 (0.824)
Retired	-0.474 (0.675)	-0.280 (0.539)	2.214*** (0.743)	-0.580 (0.961)
Unemp	-0.132 (0.607)	0.218 (0.505)	1.836** (0.862)	-0.904 (1.278)
Child	-0.555 (0.394)	-0.426 (0.326)	0.908 (0.604)	0.348 (0.597)
Ethnic	0.125 (0.448)	-0.731* (0.379)	-2.224** (1.114)	-2.017* (1.108)
Rural	0.476 (0.552)	0.385 (0.439)	0.868 (0.702)	0.924 (0.669)
Metro	0.030 (0.428)	0.034 (0.339)	0.400 (0.635)	0.697 (0.597)
Northeast	-0.589 (0.572)	-0.515 (0.435)	-0.539 (0.731)	-0.211 (0.749)
Midwest	-0.011 (0.482)	-0.276 (0.400)	-0.578 (0.685)	0.348 (0.607)
West	-0.195 (0.508)	-0.521 (0.428)	-0.568 (0.745)	-0.793 (0.803)
LowInc	0.132 (0.513)	-0.970** (0.460)	0.288 (0.682)	0.250 (0.681)
HighInc	0.162 (0.421)	0.235 (0.335)	-0.008 (0.629)	-0.461 (0.574)
Number of Observations	61	219	23	23

Note: The number of observations is 392. The number of observations for the omitted reference group is 66. An asterisk (*) denotes statistical significance at the 0.10 level; two asterisks (**) denote significance at the 0.05 level; three asterisks (***) denote significance at the 0.01 level.

Table 4. Marginal Probabilities of Selecting Sodium and Other Items, Calories, Fat, Cholesterol, or Dietary Fiber as the Most Important Information on Nutrition Labels with Respect to a One-unit Change in Each Independent Variable.

Independent Variable	Dependent Variable				
	Sodium and Other Items Prob(Y=1)	Calories Prob(Y=2)	Fat Prob(Y=3)	Cholesterol Prob(Y=4)	Dietary Fiber Prob(Y=5)
Intercept	-0.223** (0.101)	-0.018 (0.093)	0.503*** (0.131)	-0.101** (0.045)	-0.160*** (0.052)
Male	0.027 (0.042)	-0.046 (0.044)	0.005 (0.057)	0.008 (0.016)	0.006 (0.021)
Age	0.001 (0.002)	-0.002 (0.002)	-0.001 (0.002)	0.0002 (0.0007)	0.001* (0.0009)
LessEduc	0.014 (0.051)	-0.053 (0.054)	0.051 (0.071)	0.023 (0.017)	-0.035 (0.027)
Home	-0.112 (0.081)	-0.053 (0.068)	0.155 (0.095)	-0.013 (0.035)	0.023 (0.028)
Retired	0.033 (0.070)	-0.044 (0.078)	-0.049 (0.099)	0.076*** (0.027)	-0.017 (0.033)
Unemp	-0.021 (0.067)	-0.041 (0.063)	0.054 (0.089)	0.054** (0.022)	-0.046 (0.045)
Child	0.050 (0.044)	-0.041 (0.041)	-0.076 (0.057)	0.038** (0.018)	0.029 (0.022)
Ethnic	0.097* (0.050)	0.111** (0.048)	-0.092 (0.075)	-0.052* (0.031)	-0.064 (0.041)
Rural	-0.063 (0.057)	0.016 (0.053)	0.007 (0.073)	0.016 (0.018)	0.024 (0.026)
Metro	-0.012 (0.045)	-0.006 (0.045)	-0.021 (0.060)	0.010 (0.018)	0.028 (0.023)
Northeast	0.072 (0.060)	-0.026 (0.065)	-0.052 (0.083)	-0.004 (0.021)	0.010 (0.030)
Midwest	0.029 (0.054)	0.025 (0.050)	-0.064 (0.685)	-0.013 (0.019)	0.023 (0.024)
West	0.066 (0.055)	0.032 (0.052)	-0.075 (0.072)	-0.005 (0.020)	-0.018 (0.031)
LowInc	0.091 (0.061)	0.106* (0.062)	-0.257*** (0.089)	0.026 (0.019)	0.035 (0.028)
HighInc	-0.024 (0.045)	0.003 (0.043)	0.053 (0.057)	-0.005 (0.018)	-0.027 (0.022)
Number of Observations	66	61	219	23	23

Note: An asterisk (*) denotes statistical significance at the 0.10 level; two asterisks (**) denote significance at the 0.05 level; three asterisks (***) denote significance at the 0.01 level.

(34.7 percent) who ranked nutrition as most important. A multinomial logit model (equation 1) is used to identify and compare the socioeconomic characteristics of the three groups of respondents where j indicates the most important factor when purchasing wheat-based snack foods (that is, j=1, 2, or 3). The parameter estimates for the first group (taste) are normalized to zero. The parameter estimates of the multinomial logit model are presented in Table 5.

The marginal probabilities (and standard errors) that a respondent would select the jth factor (taste, price, or nutrition) as most important, given a one unit change in each socioeconomic characteristic, are presented in Table 6. Relative to females, the probability that taste or price is most important to males increases by 0.13 and 0.08, respectively, whereas the probability that males consider nutrition most important decreases by 0.21 relative to females. The probability of considering price to be most important increases by 0.06 for respondents with no college education, by 0.08 when respondents are retired, and by 0.07 when respondents have children. Relative to Caucasians/non-Hispanics, the probability that a respondent with a racial or ethnic heritage considers nutrition to be most important increases by 0.15. On the other hand, the probability that a respondent considers taste to be most important decreases by 0.18 if the respondent has an ethnic or racial heritage. The probability of a respondent considering taste to be the most important item increases by 0.12 if a respondent resides in a metropolitan area whereas the probability that a respondent will consider nutrition to be the most important item decreases by 0.11. The probability that a respondent will consider price to be the most important decreases by 0.08 for respondents with annual household incomes greater than $50,000.

Consumer Characteristics and Awareness of Middle-Eastern Wheat-based Foods

The third objective of this study was to evaluate the market potential for Middle-Eastern wheat-based foods by examining the familiarity of respondents with those foods. Respondents were asked to indicate their familiarity with pita bread, bulgur, couscous, and tabouli. Seventeen surveys (3.5 percent) are excluded because respondents did not complete these questions. Thus, the following analysis uses 467 observations. Respondents' familiarity

with Middle-Eastern wheat-based foods is presented in Table 7. A majority of respondents have never heard of tabouli (60.0 percent). About one-half of respondents have never heard of bulgur (49.9 percent) or couscous (49.0 percent). Few respondents had consumed bulgur (8.8 percent), couscous (8.1 percent), or tabouli (7.3 percent) in the year preceding the survey. Most respondents had consumed pita bread three times or less during the past year (39.8 percent), and 19.3 percent had consumed pita bread monthly. Therefore, most respondents were familiar with pita bread but were not familiar with other wheat-based Middle-Eastern dishes.

The level of familiarity for each of the four Middle-Eastern products was given a value from one ("do not know the name") to six ("consume weekly"). An index was created by summing these values for each respondent. This "familiarity" index represented respondents' aggregate awareness of pita bread, bulgur, couscous, and tabouli. The following ordinary least squares (OLS) regression model was used to assess the impact of respondents' socioeconomic characteristics and attitudes toward nutrition information on their aggregate familiarity with Middle-Eastern ethnic wheat-based foods:

$$
\begin{aligned}
\text{MidEast} = {} & \gamma_1 + \gamma_2 \, \text{Male} + \gamma_3 \, \text{Age} + \gamma_4 \, \text{LessEduc} \\
& + \gamma_5 \, \text{Home} + \gamma_6 \, \text{Retired} + \gamma_7 \, \text{Unemp} + \gamma_8 \, \text{Child} \\
& + \gamma_9 \, \text{Ethnic} + \gamma_{10} \, \text{Rural} + \gamma_{11} \, \text{Metro} + \gamma_{12} \, \text{Northeast} \\
& + \gamma_{13} \, \text{Midwest} + \gamma_{14} \, \text{West} + \gamma_{15} \, \text{LowInc} + \gamma_{16} \, \text{HighInc}.
\end{aligned}
$$
(3)

The dependent variable MidEast represents the aggregate level of familiarity (an index) with Middle-Eastern wheat-based foods; γ_1 is an intercept; and γ_2 to γ_{16} are the marginal effects of the independent variables on the dependent variable MidEast. The socioeconomic characteristics of the respondents are the same as those used in equations (1) and (2) (see Table 2).

The Breusch-Pagan-Godfrey test rejected the null hypothesis of homoskedasticity at the 0.01 level using residuals from an initial OLS regression of equation (3). Therefore, Table 8 presents parameter estimates and standard errors that have been corrected using White's heteroskedastic-consistent error covariance matrix. The parameter estimates on the gender and low-education variables are negative and highly significant. Therefore, males and less-educated shoppers were less familiar with Middle-Eastern cuisines relative to females and better

Table 5. Parameter Estimates of the Multinomial Logit Model for the Selection of Price or Nutrition as the Most Important Factor (Relative to Taste) in Snack Food Purchases.

Independent Variable	Dependent Variable			
	Price as Most Important Prob (Y=2)		Nutrition as Most Important Prob (Y=3)	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	-1.675**	0.812	-0.507	0.556
Male	0.594	0.385	-0.830***	0.272
Age	-0.010	0.015	0.007	0.011
LessEduc	0.572	0.421	-0.378	0.293
Home	0.208	0.532	0.022	0.402
Retired	0.875	0.578	-0.250	0.434
Unemp	0.552	0.499	0.511	0.360
Child	0.891**	0.405	0.161	0.249
Ethnic	0.590	0.463	0.757**	0.335
Rural	-0.240	0.463	-0.462	0.319
Metro	-0.255	0.416	-0.533**	0.262
Northeast	-0.409	0.581	0.019	0.362
Midwest	-0.299	0.433	-0.068	0.292
West	-0.055	0.457	0.198	0.318
LowInc	0.443	0.465	0.090	0.376
HighInc	-0.946**	0.445	0.199	0.254
Number of Observations	46		140	

Note: The number of observations is 403. The number of observations for the omitted reference group is 217. An asterisk (*) denotes statistical significance at the 0.10 level; two asterisks (**) denote statistical significance at the 0.05 level; three asterisks (***) denote statistical significance at the 0.01 level.

Table 6. Marginal Probabilities of Selecting Taste, Price, or Nutrition as the Most Important Factor in Snack Food Purchases with Respect to a One-unit Change in Each Independent Variable.

Independent Variable	Dependent Variable					
	Taste as Most Important Prob (Y=1)		Price as Most Important Prob (Y=2)		Nutrition as Most Important Prob (Y=3)	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	0.184	0.129	-0.122*	0.069	-0.062	0.124
Male	0.132**	0.060	0.075**	0.030	-0.207***	0.059
Age	-0.001	0.002	-0.001	0.001	0.002	0.002
LessEduc	0.044	0.069	0.059*	0.032	-0.104	0.067
Home	-0.015	0.086	0.017	0.045	-0.001	0.082
Retired	0.004	0.099	0.080*	0.049	-0.084	0.097
Unemp	-0.128	0.083	0.029	0.042	0.098	0.078
Child	-0.077	0.057	0.069**	0.031	0.008	0.055
Ethnic	-0.178**	0.077	0.025	0.037	0.153**	0.072
Rural	0.102	0.070	-0.005	0.037	-0.097	0.069
Metro	0.117*	0.060	-0.004	0.032	-0.113*	0.058
Northeast	0.017	0.083	-0.034	0.045	0.017	0.081
Midwest	0.029	0.066	-0.023	0.035	-0.006	0.064
West	-0.036	0.071	-0.011	0.037	0.047	0.069
LowInc	-0.040	0.087	0.034	0.037	0.007	0.085
HighInc	0.010	0.057	-0.084***	0.032	0.075	0.055
Number of Observations	217		46		140	

Note: An asterisk (*) denotes statistical significance at the 0.10 level; two asterisks (**) denote statistical significance at the 0.05 level; three asterisks (***) denote statistical significance at the 0.01 level.

Table 7. Familiarity of Respondents with Four Middle-Eastern Wheat-based Foods.

Response	Middle-Eastern Wheat-based Foods			
	Pita Bread	Bulgur	Couscous	Tabouli
	------------------------- percent -------------------------			
Do not know the name	5.8	49.9	49.0	60.0
Know only the name	14.1	25.1	21.6	15.6
Have consumed three times or less ever	17.1	13.1	14.8	11.3
Have consumed three times or less in the past year	39.8	8.8	8.1	7.3
Consume monthly	19.3	3.0	5.1	5.8
Consume weekly	3.9	0.2	1.3	0.0

Note: Sample size = 467.

Table 8. OLS Parameter Estimates for the Aggregate Level of Familiarity with Middle-Eastern Wheat-based Foods.

Independent Variable	Parameter Estimate	Standard Error
Intercept	11.023***	0.847
Male	-1.390***	0.387
Age	0.005	0.016
LessEduc	-1.709***	0.355
Home	-0.423	0.493
Retired	-1.460***	0.584
Unemp	-0.199	0.504
Child	-0.855*	0.389
Ethnic	-0.831*	0.509
Rural	-1.132***	0.423
Metro	0.431	0.402
Northeast	1.018**	0.481
Midwest	-0.562	0.425
West	0.141	0.549
LowInc	-1.136***	0.442
HighInc	-0.072	0.389
Adjusted R-Square	0.128	

Note: Sample size = 467. An asterisk (*) denotes statistical significance at the 0.10 level; two asterisks (**) denote statistical significance at the 0.05 level; three asterisks (***) denote statistical significance at the 0.01 level.

educated shoppers. Similarly, respondents who are retired, those with children, those who have an ethnic or racial heritage, and those whose annual household income is less than $20,000 were also less familiar with Middle-Eastern wheat-based foods. In addition, respondents residing in rural areas were also less familiar with such foods. The variable indicating that an individual resides in the Northeast is significant, and the sign of its coefficient is positive. Therefore, respondents living in the Northeast were more familiar with Middle-Eastern wheat-based foods.

Conclusions and Implications

The objectives of this study were to identify and evaluate U.S. consumers' (1) use of nutrition labeling on wheat-based foods, (2) attitudes toward the importance of taste, price, and nutrition in choosing wheat-based snack foods, and (3) awareness of Middle-Eastern wheat-based foods. A random survey of U.S. primary grocery shoppers was conducted in October 1995. Data from 484 questionnaires were used in this study. The distribution of socioeconomic characteristics of respondents in our sample was slightly skewed toward Caucasians/non-Hispanics, those with college educations, and households with annual incomes greater than $50,000. Although the sample was similar to that of the U.S. population in all other areas, some caution should be exercised when applying our results to the general population.

Most respondents believed that it was important for their diets to contain wheat-based food products. A majority of respondents indicated that they considered fat content to be the most important item on food nutrition labels when making a wheat-based food purchase decision. Respondents with an ethnic or racial heritage and those with lower incomes were less likely to consider fat to be the most important item on nutrition labels. This suggests that low-income families should be targeted for additional nutrition education. Given that low incomes are often used to determine eligibility for government assistance food programs, such programs may provide a vehicle for improving nutrition education.

A majority of respondents indicated that taste was the most important factor when making wheat-based snack food purchases. Respondents with higher than average incomes were less likely to consider price to be the most important. However,

respondents with children were more likely to consider price to be the most important. Males were less likely to consider nutrition to be the most important relative to females. Each of these findings suggests a variety of niche-marketing strategies for agricultural producers, food processors, and retailers.

Most respondents were not familiar with Middle-Eastern wheat-based foods. Male respondents, respondents with no college education, retired respondents, those with no children in households, those residing in rural areas, and those with low annual household incomes were less familiar with pita bread, couscous, bulgur, and tabouli. Respondents residing in the Northeast were more familiar with Middle-Eastern dishes. This probably reflects the ethnic diversity of the northeast region of the United States.

The information reported on nutrition labels of wheat-based foods is frequently read by food shoppers, and health professionals suggest that diets should be low in fat and high in fiber. Most wheat-based foods meet these criteria. Nonetheless, our survey respondents were much more likely to read the fat content reported on wheat-based food nutrition labels than they were to read the fiber content. Either our respondents were already aware that wheat-based foods are high in fiber, or there is a need for more efforts to educate individuals of the importance of fiber in foods and, especially, the fiber content of wheat-based foods.

The food industry continually tries to match products with the demands of consumers. Thus, firms need to identify the food product characteristics desired by consumers. Our research indicates that consumers generally do not consider nutrition to be the most important factor when purchasing snack foods. In addition, consumers with little education and low incomes would be less likely to purchase high-priced, healthy snack foods. Firms need to consider the relative effectiveness of targeting individuals who have a strong preference for nutritious snacks. For example, females are more likely than males to base their snack-food purchases on nutritional qualities.

The current unfamiliarity of Americans with Middle-Eastern wheat-based food products limits the potential for their development. The usage and interest in diverse wheat-based foods appear positively linked with nutrition concerns and awareness of the benefits of wheat-based foods. In addition, individuals with higher-than-average incomes were

more familiar with these products. Therefore, further efforts might consider the relative merits of marketing Middle-Eastern wheat-based foods to a higher-income market segment versus the possibility that lower-income families may represent an untapped market for these products. Further research could examine the perceptions of those who are currently knowledgeable about Middle-Eastern food products to determine their future market potential. In addition, sensory studies might evaluate the possible adaptation of recipes with bulgur and couscous to meet the taste of the American population and to increase the demand of wheat-based foods at the retail and food service levels.

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