Traditional and Nontraditional Determinants of Household Expenditures on Selected Fruits and Vegetables

David W. Price, Dorothy Z. Price and Donald A. West

Nontraditional variables such as liquid assets, household management style, and psychological need levels influence both the type and variety of fruits and vegetables served by Washington households. Among traditional variables, household size, education levels, and geographic area within Washington State are relatively important factors. Income and occupation are relatively weak as explanatory variables. The liquid asset effect shows that when the propensity to save is controlled, households with higher asset levels consume a larger amount and a greater variety of fruits and vegetables.

In a period of increased concern about nutritional well-being, economists are being challenged to develop more complete explanations of food expenditure behavior. Much of the inducement comes from policy makers charged with making food programs more effective. Additional stimulus is provided by the research establishment. Scientists can now apply an expanded set of methods to comprehensive data sets in their search for previously undiscovered relationships. Potential payoffs include increased understanding of how demand for specific groups of food commodities may be influenced by socioeconomic characteristics not previously considered.

Traditionally, economists have focused their attention on food expenditure-income relationships with appropriate recognition of household size and composition, location, and some other socioeconomic characteristics. Theories of consumer behavior, such as those expressed by Burk, list numerous determinants of food consumption, but these have seldom been analyzed explicitly because of data limitations. The incorporation of these and other variables into empirical analyses can provide a more complete understanding of food consumption behavior.

Expanded empirical analyses are hampered by the lack of well developed conceptual frameworks and data on nontraditional variables. Nevertheless, such attempts appear justified in the light of growing concern about determinants of food consumption. The results presented here stem from an initial effort to assess the effect of an expanded set of factors, including liquid assets, household management styles and psychological "need" levels, on food expenditures. The approach taken illustrates how empirical analysis of a larger set of variables may be undertaken and identifies a number of relationships deserving further study.

Model Development

Currently analyses of determinants of choice among food items are as likely to

David W. Price is Professor of Agricultural Economics, Dorothy Z. Price is Professor and Chairman of Child and Family Studies, and Donald A. West is Associate Professor of Agricultural Economics, all at Washington State University.

Scientific Paper No. 5420, Project 0331, College of Agriculture Research Center, Washington State University.

This research was partially funded from a grant from the Food and Nutrition Service, U.S. Department of Agriculture.

include household tastes and preferences as traditional factors such as income. Given the extremely large number of food items available to a household, investigation of the nontraditional determinants is more manageable if it focuses on a specific food group. The food group chosen for this study is fruits and vegetables. Most of the foods within this group, excepting a few of the starchy items, are "normal" goods whose consumption increases with income. Expenditures on this group constitute only about one-seventh of total outlays [West], so households have some flexibility in varying their consumption of these items. The number of individual food items within the group is quite large, and there is considerable variation among households in their choices among the foods and the amounts they spend on these items. Thus, variations in the consumption of fruits and vegetables should be sensitive to variations in traditional and nontraditional explanatory variables included in the model formulated below. Additionally, there is particular interest in the consumption of fruits and vegetables from a nutritional standpoint.

The model specified for the analysis is:

$$C_{fv,i} = F\,(HS, I, A_e, M, NL, O_h, Ed_f, EO, SD, Fr, G)$$

where:

- $C_{fv,i}$ = consumption of foods within the i^{th} group of fruits and vegetables,
- HS = Household size,
- I = income,
- A_e = liquid assets,
- M = management style of the adult female,
- NL = psychological need levels of the adult female,
- O_h = occupation of household head,
- Ed_f = education of the adult female,
- EO = whether or not the household eats out regularly,
- SD = whether or not any household member has a special diet,
- Fr = whether or not the household possesses a food freezer, and
- G = geographic area where the household is located.

Among the variables, household size and current income are traditional variables held in previous analyses to influence food consumption. Higher priced fruits and vegetables are hypothesized to be positively affected by increases in current consumer incomes, while moderately priced items are not expected to be positively affected. Low priced items such as dried beans should be negatively affected by increases in consumer income. It is also hypothesized that higher consumer incomes increase the variety of fruits and vegetables served. High incomes enable these households to purchase more of both higher and lower priced items.

Household size may have two opposing effects on the variety of fruit and vegetables consumed. First, it is hypothesized that in larger households, the increased number of persons has a larger range of preferences. This wider range of preferences leads to a wider variety of items purchased by the household. An opposing hypothesis is that the larger households must serve items that are acceptable to all members. The number of foods meeting this criterion may be smaller. Since many fruits and vegetables are prepared for one or two persons rather than the household, the former hypothesis is expected to dominate.

Liquid assets have been included less often in empirical analyses of food consumption, although a number of studies indicate that they should be recognized [Ferber]. While liquid assets have been recognized as an independent determinant of some expenditures, they may also serve as a proxy for permanent income or as a reservoir of funds available for immediate purchases. A time series study by Cheng indicates that per capita consumption of nondurables is directly affected by liquid asset holdings. Additional-

ly, West and Price report, based on a cross section survey, that total assets positively affect food expenditures.

In a summary article, Crockett posits that the asset-expenditure effect varies with the ratio of household's actual to desired holdings of assets. Households whose actual levels of assets meet or exceed desired levels have a higher propensity to consume. When their current incomes decline, the propensity to consume is relatively high and expenditures will be directly related to liquid asset holdings. Moreover, the liquid asset effect appears to be associated with age. Projector notes that the fraction of net worth spent for consumption is higher for persons in the 35-44 age group than for those who are older.

In an analytical framework, the desire to accumulate assets, i.e., the propensity to save, should be held constant when analyzing the effects of income and liquid assets on food expenditures. In cross sectional analyses, this can be accomplished to some extent by utilizing a sample that is relatively homogeneous in terms of life cycle and age of head, assuming that the desire to accumulate assets is related to current and anticipated family needs. In our study of households headed by middle-aged parents, these needs are held relatively constant.[1] It is hypothesized that the level of liquid assets held has a positive effect on consumption of the higher priced fruits and vegetables and the variety of fruits and vegetables consumed.

Another nontraditional variable, family management style, determines many aspects of a family's life style and is strongly indicative of values to which family members are committed. Two major types of decisions identified by Drucker and Simon prevail in different management styles. One type, programmed and routine decisions, relates most clearly to a traditional management style which is highly goal-directed, objective, and focused on economy and efficiency. The second style is characterized by strategic and nonprogrammed decisions which emphasize creativity, flexibility, and an overriding concern with each individual. This type is known as a humanistic management style. Several theorists, such as Diesing, have elaborated on these categories and have attempted to identify additional decision or management styles.

A third style, classified as organizational, has been indicated in studies by Dorothy Price, Harvey, and Weber. In this style, emphasis is on the group as a whole. The organizational style is characterized by a pseudo-democratic environment, selective communication, and resistance to change. It is hypothesized that humanistic household management styles are associated with a wider variety of foods served. The traditional style is expected to be associated with fewer more economical items. Households managed in an organizational style are expected to cling to existing patterns or readily adopt foods associated with a peer group.

As to need levels, the effect of social psychological factors on consumption patterns has long been recognized. Specific consumer expenditures, as all behaviors, are motivated by both needs and values. The need level at which an individual operates will, therefore, affect consumption at any given time. Self-actualization theory, as first expounded by Goldstein and redefined by Maslow, views all behavior as highly motivated by a progressive level of needs. These needs move from basic, deficiency needs up through high, growth-oriented needs. It is hypothesized that consumption of food represents the most basic deficiency need, a physiological need, and that a higher index value for this need is directly related to consumption of basic foods. However, since food can represent a multiplicity of factors to individuals, the specific food items purchased, consumed, and/or served to family members can be related to any need level. Cultural factors, ethnic background, geographical origin, and early family life style and relationships can combine to associate

[1]The reason for this is that the primary purpose of the sample was to evaluate the school lunch program.

certain foods or food patterns with certain need levels.

Consumption of familiar foods indicates a high security need. Therefore, it is hypothesized that such individuals with high security needs are hesitant to accept unusual fruits or vegetables. Foods associated with gatherings of family and friends are important to those with a high need for belonging. Those who have a high self-esteem need desire prestige or status foods and buy more expensive fruits and vegetables. Finally, it is hypothesized that individuals at a self-actualization level are inclined to try new foods and use a great variety of foods. These people are expected to serve the greatest number and types of fruits and vegetables.

Occupation of the household head measures variation in food requirements associated with different types of work. Less manual labor is hypothesized to result in the consumption of lower calorie foods. Therefore, white collar workers are expected to consume more green leafy vegetables and less dried beans than blue collar workers.

Education of the female adult is expected to pick up variation in nutritional knowledge among those purchasing and preparing food. Education is also a proxy for social class. Those with more education are generally exposed to a wider variety of experiences. Education is, therefore, hypothesized to positively affect both consumption of the fruits and vegetables with high nutritional values and the variety of fruits and vegetables consumed.

Households that eat out frequently are exposed to some foods which may not be familiar to some members. These households are hypothesized to have a greater variety of fruits and vegetables in their diet and to be more likely to consume the types frequently served in restaurants than other households. The variable, persons on a speical diet, primarily represents persons whose calorie intake is restricted and diabetics. These households are hypothesized to consume fewer of the fruits and vegetables with a high sugar content and more of the items with a low sugar content.

Households using large freezers have the ability to buy fresh fruits and vegetables in season and store them for later use. They also are better able to store frozen foods which may be purchased in the grocery store. It is hypothesized that these households serve more frozen items, more items typically produced in the home garden, and more items that are available from local producers at harvest time.

The State of Washington has a very heterogeneous climate. In some areas, fresh produce is readily available from local producers at certain times of the year, while other areas do not provide such access. Climate may also affect the types of food consumed. Geographic area within the State of Washington was included to measure variation in access to fresh produce and regional differences in food consumption. In addition, in some areas of the state, households come into contact with minority groups with preferences for specific foods. These contacts may affect the consumption of households.

Data and Procedures

Data used in the analysis were collected in 1972 and 1973 from a sample of 497 White households containing 8-12 year old children. The sample was selected to be representative of school children in the State of Washington, 92.1 percent of whom are White. The sample contained a higher percentage of children from low-income homes than does the state's population; 31 percent had incomes below 125 percent of the poverty level as compared to 12 percent for the state (see Price and West for details). With the requirement that each household contain at least one 8-12 year old child, stage of life cycle was held relatively constant. As a result of this requirement, household size averaged 5.3 persons compared to a state population average of 3.0 persons [U.S. Bureau of Census]. Households at this stage of their life cycle were expected to have moderate hold-

ings of assets — more than young households, but less than those approaching retirement.

Data were collected in a series of personal interviews conducted with household members. Information on socioeconomic characteristics was gathered from the head or spouse, while data on foods served, psychological need levels, and management style were collected from the person usually in charge of food preparation. In addition to income, occupation, and other characteristics, respondents were asked to record the value of homes, vehicles, and other property owned. Liquid assets were measured by the sum of respondent's minimum monthly balances in their checking accounts plus balances in saving accounts.

Fruit and vegetable "consumption" was measured by the number and types of these foods usually served. "Usually served" was defined as served at least once every two weeks. Using a checklist, interviewers identified food items "consumed" by the household. While this approach did not identify quantities consumed, it did indicate the type and variety of foods that made up the household's diet.

Psychological need levels were measured from a Q-sort of 30 basic need statements [Price, et al.]. Respondents sorted the statements into five categories ranging from "most like you" to "least like you." Statements were assigned a numerical value ranging from 1 through 5 (5 was assigned to "most like you"). This indirect form of questioning indicated which of five need levels were most important to respondents. Management styles were identified from a forced choice test of 15 questions, each with three alternatives [Price, et al.]. Answers to these questions depicted which of the three management styles characterized the person in charge of food preparation. The number of responses corresponding to a particular management style was summed to yield a score for that style. If, for example, eight responses were of the traditional style, the respondent was assigned a traditional management score of 8.

Factor Analysis of Consumption Data

There were 49 different vegetables and salads, and 28 different fruits served by 10% or more of the households. For further details on types and consumption by ethnic groups, see Price. In order to reduce the number of items to be analyzed and to identify groups of foods similarly preferred by the households, a factor analysis of the individual food items was conducted. Households with strong preferences for a food, as evidenced by the frequency with which it was served, were expected to have relatively high preferences for items with similar flavor, texture, and appearance. Under this assumption, factor analysis of variables indicating whether or not the food was usually served would group similar food items and they would be expected to be close substitutes for one another.

Food items consumed by nearly all of the households, or very few of them, provided less variation in the data. Inclusion of dummy variables representing the proportion of households usually serving such foods may also cause bias in correlation coefficients when the values of the variables are near 0.0 to 1.0.[2] Consequently, fruit and vegetable items consumed by more than 85 percent or less than 15 percent of the households were excluded from the analysis.[3] The exclusions left 65 types of fruits and vegetables to be analyzed.

[2]This bias may lead to difficulty or artifactual factors. That is, those factors resulting from the covariance of different proportions of dichotomous variables within the data matrix. These factors result from high correlations between dichotomous variables caused simply because the variables contained a high proportion of zeros or ones and not from any necessary relationship between variables [Rummel, 303-305].

[3]This leads to the exclusion of many important fruits and vegetables, including fresh tomatoes, fresh lettuce, fresh corn, fresh carrots, fresh apples, fresh oranges and tossed salads. Since nearly all households consume these items, there is little variance in the dependent variable to be explained by a regression model.

The factor analysis consisted of first extracting principal components, then rotating by the varimax criterion. All components with eigenvalues greater than 1.0 were retained. This analysis yielded 23 components which accounted for 62.4 percent of the variance of the original 65 variables.[4] These components constitute the basis from which the food preference (consumption) variables used as dependent variables in subsequent regression analyses were formed.

Generally, the factors consist of fruit or vegetable items that are similar in taste, texture, and appearance (Table 1). There are, of course, some exceptions. Dissimilar items appearing in the factors generally have relatively low factor loadings and, thus, do not have a large influence on the factor. Most factors contain items similar enough so that identification and interpretation of the factors is relatively easy. Names assigned to the factors are listed in the first column of Table 1. The names assigned correspond to the items with the highest loadings. Items with low loadings may be erroneously associated with the factor due to estimation error. In most cases, the factors contain vegetables only or fruits only, but there are a few instances where both are included in the same factor.

Regression Analysis and Results

Of the 23 factors, 18 were regressed with socioeconomic, psychological, and management variables.[5] The dependent variables were formed by weighting the most important food items in the factor by the square of the factor loadings [see Rummel, p. 441]. The variables and weights used in their construction are listed in Table 2. Regression results for these variables are shown in Table 3. To further explore the relationship of the socioeconomic and psychological variables to fruit and vegetable consumption, the number of the various types of fruits and vegetables served were used to form an additional five dependent variables for similar analysis (Table 4).

In addition to liquid assets, need levels, and management style, explanatory variables included current income, occupation of household head, household size, education of the adult female, geographic area within the state, and freezer ownership. Households that regularly ate out as a group and those where someone was on a special diet were identified using dummy variables. Current household income was measured as the sum of annual earnings plus any transfer payments. Income and assets were placed on adult-equivalent bases [*Monthly Labor Review*].

Among the results, the level of liquid assets held by the household directly influences most of the fresh fruit, fresh vegetable, and processed fruit factors, as well as the number of salads and the number of juices served (Tables 3 and 4). This indicates that liquid assets are associated with increased consumption of these food groups and supports the hypothesis that having liquid assets increases the propensity to consume certain food items. The factors not influenced by liquid assets, processed vegetables, represent lower cost food items. Some of these are

[4]One problem in factor analysis is the stability of the factors. With different samples and/or different numbers of factors extracted, different results may be obtained. A preliminary run was made using 100 food items including items other than fruits and vegetables. All items consumed by less than 20 percent or more than 80 percent of the sample were excluded. This sample included Mexican American and Black households in addition to the White households used in analysis of fruits and vegetables. These additions increased the sample size to 978 observations. There were 25 factors extracted with an eigenvalue cutoff of 1.167. These factors explained 50.6 percent of the variation in the 100 food items. The fruit and vegetable factors are comparable to those found in Table 1. This indicates that the factor analysis conducted with either sample has identified stable groupings of commodities.

[5]The five factors excluded contained a high factor loading on only a single vegetable. Therefore, the dependent variable for regression analysis essentially reduces to a dummy variable. This requires the use of logit or probit analysis which adds considerably to the complexity of the study. In addition, most of these vegetables were consumed by less than 30 percent of the sample, making them less important.

TABLE 1. Food Factors Extracted From Foods Served for 65 Fruits and Vegetables: Households with 8 to 12-year old children, State of Washington, 1972-73

Factor	Individual Foods[a] (Factor Loadings in Parentheses) [Sample Means in Brackets]
1. Fresh Tree Fruits	Fr. Peaches (.764) [.58] Fr. Pears (.719) [.46] Fr. Cherries (.576) [.34] Fr. Apricots (.486) [.16] Fr. Plums (.484) [.31]
2. Melons	Fr. Cantaloupe (.699) [.46] Fr. Watermelon (.569) [.75] Fr. Grapefruit (.363) [.23] Can. Pineapple (.338) [34]
3. Fresh Berries	Fr. Raspberry (.785) [.26] Fr. Strawberry (.738) [.44]
4. Common Canned Fruits	Can. Peaches (.756) [.86] Can. Pears (.690) [.73] Fr. Bananas (.541) [.85] Applesauce (.465) [.74] Can. Fruit Cocktail (.32) [.46]
5. Other Canned Fruits	Can. Apricots (.685) [.22] Can. Cherries (.625) [.17] Can. Prunes & Plums (.427) [.18] Fr. Apricots* (.447) [.16]
6. Frozen Berries	Fz. Strawberry (.702) [.56] Fz. Raspberry (.586) [.32]
7. Dried Fruits	Prunes (.701) [.21] Raisins (.681) [.58] Canned Asparagus (.443) [.21]
8. Fruit Salad	Jello Salad (.664) [.64] Fruit Salad (.620) [.42] Fr. Grapes (.325) [.49] Fr. Celery* (.339) [.85] Cottage Cheese Salad* (.306) [.18]
9. Fresh Garden Vegetables	Fr. Green Beans (.740) [.17] Fr. Beets (.615) [.15]
10. Common Fresh Vegetables	Fr. Sweet Potato (.676) [.49] Green Peppers (.592) [.64] Fr. Squash (.512) [.65] Fr. Celery (.452) [.85]
11. Fresh Cabbage	Fr. Cabbage (.739) [.50] Fr. Cole Slaw (.661) [.70]
12. Fresh Cucumbers	Fr. Cucumber (.604) [.31] Can Pineapple (.437) [.34] Cottage Cheese Salad* (.308) [.18] Beet Greens (−.398) [.20]
13. Fresh Green Vegetables	Fr. Asparagus (.712) [.16] Fr. Broccoli (.651) [.19] Fr. Cauliflower (.517) [.31] Cottage Cheese Salad (.732) [.18]
14. Common Canned Vegetables	Can. Corn (.801) [.78] Can Peas (.735) [.64] Can. Green Beans (.735) [.84] Can Spinach (.371) [.32] Can Tomatoes (.320) [.57] Can. Beets* (.353) [.38] Can. Asparagus* (.348) [.21]
15. Other Canned Vegetables	Can. Carrots (.733) [.20] Can. Beets (.369) [.38] Can Prunes & Plums* (.334) [.18] Fr. Grapes* (.323) [.49]
16. Common Frozen Vegetables	Fz. Peas (.797) [.63] Fz. Corn (.771) [.69] Fz. Green Beans (.730) [.36]
17. Frozen Green Vegetables	Fz. Broccoli (.786) [.46] Fz. Cauliflower (.758) [.33] Fz. Brussels Sprouts (.688) [.28] Fz. Spinach (.411) [.24]
18. Frozen Carrots	Fz. Carrots (.813) [.15]
19. Frozen Asparagus	Fz. Asparagus (.771) [.15] Fr. Grapefruit* (−.304) [.23]
20. Frozen Mixed Vegetables	Fz. Mixed Vegetables (.733) [.19] Can. Spinach* (.315) [.32]
21. Dried Vegetables	Kidney Beans (.731) [.21] Navy Beans (.688) [.26] Split Peas (.532) [.19]
22. Macaroni & Potato Salad	Potato Salad (.745) [.57] Macaroni Salad (.674) [.32]
23. Mexican Vegetables[b]	Pinto Beans (.729) [.36] Can. Hominy (.418) [.16] Green Peppers* (.359) [.64] Can. Spinach* (.320) [.32]

*Indicates that the food has a higher factor loading elsewhere.

[a]Includes all foods for any factor that has a loading of .300 or more except in cases where the highest loading is less than .300.

[b]This factor was so varied because the items with the highest 2 loadings are served by a high percentage of Mexican American households [see Price]. Thus, white households serving these items would be serving Mexican foods.

TABLE 2. Factors and Weights Used in Constructing Dependent Variables for Regression Analysis of Food Consumption

Variable	Individual Item (Weights in Parentheses)
1. Fresh Tree Fruits	Peaches (.584) Pears (.517) Cherries (.332) Apricots (.236) Plums (.234)
2. Fresh Melons	Cantaloupe (.489) Watermelon (.324)
3. Fresh Berries	Raspberry (.616) Strawberry (.545)
4. Common Canned Fruits	Peaches (.572) Pears (.476) Fr. Bananas (.293) Applesauce (.216) Fruit Cocktail (.103)
5. Other Canned Fruits	Apricots (.469) Cherries (.391) Prunes and Plums (.182)
6. Frozen Berries	Strawberry (.493) Raspberry (.343)
7. Dried Fruits	Prunes (.491) Raisins (.464)
8. Fruit Salads	Jello (.441) Fruit Salad (.384) Fresh Grapes (.106)
9. Fresh Garden Vegetables	Fr. Green Beans (.548) Fr. Beets (.378)
10. Common Fresh Vegetables	Sweet Potatoes (.457) Green Peppers (.350) Squash (.262) Celery (.204)
11. Fresh Cabbage	Fr. Cabbage (.546) Cole Slaw (.437)
12. Fresh Green Vegetables	Asparagus (.507) Broccoli (.424) Cauliflower (.267)
13. Common Canned Vegetables	Corn (.642) Peas (.540) Green Beans (.540)
14. Common Frozen Vegetables	Peas (.605) Corn (.594) Green Beans (.538)
15. Frozen Green Vegetables	Broccoli (.618) Cauliflower (.575) Brussel Sprouts (.473) Spinach (.169)
16. Dried Vegetables	Kidney Beans (.534) Navy Beans (.473) Split Peas (.283)
17. Macaroni & Potato Salad	Potato Salad (.555) Macaroni Salad (.454)
18. Mexican Vegetables	Pinto Beans (.573) Canned Hominy (.175)

TABLE 3. Regression Results: Relationship Between Fruit and Vegetable Consumption and Socioeconomic and Psychological Variables

Independent Variables	Dependent Variables: Fresh Tree Fruits	Fresh Melons	Fresh Berries	Common Canned Fruits	Other Canned Fruits	Frozen Berries	Dried Fruits	Fruit Salads
	t values							
Income	N	N	N	N	−2.84**	−1.45	−1.87	−1.51
Liquid Assets	2.32*	N	2.70**	1.96*	2.80**	3.16**	2.32*	1.27
Management Type								
Traditional	−2.34*	−1.00	−2.25*	−3.10**	N	−1.13	N	N
Humanistic	N	N	N	−1.67	1.43	N	N	N
Need Level								
Physiological	N	−1.04	1.42	N	−1.42	N	1.03	−2.36*
Love & Belonging	N	1.12	2.54*	2.63**	N	1.88	N	N
Self Esteem	1.24	N	1.84	N	N	N	N	N
Self Actualization	N	1.39	2.24*	N	N	1.11	2.59**	N
Occupation								
White Collar	−1.29	N	N	N	1.03	N	N	1.25
Armed Forces	N	1.05	N	−2.29*	N	N	N	N
Service	−2.11*	1.73	N	N	−1.49	N	N	−1.99*
Household Size	3.56**	N	1.03	1.02	2.40*	1.39	2.89**	1.52
Education of Adult Female	2.64**	N	1.16	N	N	−1.41	1.62	3.14**
Household Eats Out	2.57*	1.95*	N	2.86*	1.18	1.78	N	2.85**
Anyone on a Special Diet	2.41*	N	2.04*	N	N	−1.45	N	−1.18
Own Large Freezer	1.49	1.10	N	1.00	1.17	4.08**	1.97*	N
Geographic Area								
Eastern Washington	1.49	N	−.80	N	N	N	−1.81	−1.50
Central Washington	N	N	−3.54**	N	1.14	−2.86**	−2.17*	−2.55*
Northwestern Washington	1.71	1.45	N	−1.50	N	−1.29	−1.11	−2.04*
South Metro Washington	N	−1.71	N	N	−1.06	−1.27	1.41	−1.61
R^2	.161	.089	.120	.129	.071	.121	.086	.127

TABLE 3. (continued)

Independent Variables	Dependent Variables: Fresh Garden Veg's	Common Fresh Veg's	Fresh Cabbage	Fresh Green Veg's	Common Canned Veg's	Common Frozen Veg's	Frozen Green Veg's	Dried Veg's
	t values							
Income	−2.26*	−1.34	N	N	N	N	N	N
Liquid Assets	3.93**	2.38*	1.56	1.10	N	N	N	N
Management Type								
Traditional	N	N	N	N	N	−1.40	−1.31	−2.79**
Humanistic	N	N	1.75	N	N	N	−1.00	N
Need Level								
Physiological	N	−1.35	−1.96*	N	N	N	N	N
Love & Belonging	1.32	1.05	N	N	N	N	N	N
Self Esteem	N	−1.00	N	N	N	N	N	1.75
Self Actualization	N	1.59	N	1.54	N	N	1.38	1.55
Occupation								
White Collar	N	N	N	2.40*	−1.51	2.10*	3.34**	N
Armed Forces	1.87	N	N	N	1.15	N	N	N
Service	N	N	N	N	N	N	N	N
Household Size	3.30**	4.31**	4.26**	N	1.05	1.90	N	2.21*
Education of Adult Female	N	2.40*	1.19	1.16	−2.09*	1.85	N	N
Household Eats Out	N	N	N	N	1.64	N	1.08	N
Anyone on a Special Diet	2.32*	N	1.55	N	−1.94	N	N	N
Own Large Freezer	N	1.78	−1.45	N	−1.65	3.02**	3.07**	1.37
Geographic Area								
Eastern Washington	N	−1.58	N	N	2.82**	N	N	1.59
Central Washington	−2.42*	N	N	N	1.08	−1.70	N	N
Northwestern Washington	−2.03*	−1.67	N	3.09**	1.22	−1.93	N	1.45
South Metro Washington	−2.60**	−3.14**	−1.38	N	1.04	N	N	1.24
R^2	.091	.144	.090	.110	.067	.080	.086	.084

TABLE 3. (continued)

Independent Variables	Dependent Varables: Macaroni & Potato Salad	Mexican Veg's	Number of Items with Significance
	t values		
Income	N	−2.29*	3
Liquid Assets	N	N	8
Management Type			
Traditional	−1.19	−2.67**	5
Humanistic	1.34	N	0
Need Level			
Physiological	−1.16	−1.46	2
Love & Belonging	1.19	N	2
Self Esteem	N	N	0
Self Actualization	N	N	2
Occupation			
White Collar	N	1.68	3
Armed Forces	2.28*	1.01	2
Service	N	N	2
Household Size	1.95	2.01*	8
Education of Adult Female	N	−3.84**	5
Household Eats Out	N	N	4
Anyone on a Special Diet	−1.11	1.08	3
Own Large Freezer	N	N	4
Geographic Area			
Eastern Washington	N	1.59	1
Central Washington	N	2.63**	6
Northwestern Washington	−1.36	N	3
South Metro Washington	−1.36	−1.90	2
R^2	.062	.130	

N denotes t value is less than 1.00 in absolute value.

* Significant at the .05 level. t=1.96.

** Significant at the .01 level. t=2.59.

protein substitutes and generally have lower income elasticities in food expenditure studies.

In contrast, current income is significant for only three food factors and the coefficients in these instances are negative. The negative relationships with the Mexican vegetable factor is expected since this grouping contains inexpensive foods. Similarly, the canned fruit factor possibly reflects consumption of less expensive juices. The indirect relationship with fresh vegetables may be picking up more home garden production among low-income households, although no inferences can be drawn from this analysis. Income also negatively affects the number of dried vegetables and the number of juices served. Overall, current income does not provide the explanatory power for fruit and vegetable consumption provided by liquid assets.

Traditional management is a relatively strong explanatory variable. All significant relationships are negative and are found for less common fruits and vegetables, both fresh and processed. This relationship is consistent with the hypotheses since the traditional homemaker is likely to continue to

TABLE 4. Relationship Between Number of Fruits and Vegetables Served and Socioeconomic and Psychological Variables

Independent Variables	No. of Vegs. Served	No. of Dried Vegs. Served	No. of Salads Served	No. of Juices Served	No. of Fruits Served	No. of Items with Significant Relationship
Income	−1.23	−2.25*	N	−2.37*	N	2
Liquid Assets	1.80	N	2.04*	N	3.01**	2
Management Type						
Traditional	−2.06	−3.86**	N	N	−2.70**	3
Humanistic	N	N	N	1.79	N	0
Need Level						
Physiological	−1.69	N	−2.45	−2.28*	N	2
Love & Belonging	N	N	N	N	2.01*	1
Self Esteem	N	N	N	N	N	0
Self Actualization	2.78**	1.68	N	1.71	2.12*	2
Occupation						
White Collar	1.90	2.69**	N	1.48	N	1
Armed Forces	2.05*	1.74	N	N	N	1
Service	N	N	−1.48	1.00	N	0
Household Size	2.97**	2.77**	2.44*	2.42*	2.51*	5
Education of Adult Female	N	−1.93	1.26	N	2.33*	1
Household Eats Out	2.68**	N	2.31*	3.62**	2.71**	4
Anyone on a Special Diet	1.10	N	N	N	N	0
Own Large Freezer	2.01**	N	N	2.35*	2.28*	3
Geographic Area						
Eastern Washington	N	2.36*	N	−1.19	N	1
Central Washington	−1.34	1.87	−1.72	−1.10	−3.04**	1
Northwestern Washington	N	1.38	−1.60	2.80**	N	1
South Metro Washington	N	−2.08	N	−1.08	−1.99*	2
R^2	.166	.139	.108	.182	.198	

N denotes t value is less than 1.00 in absolute value.

* Significant at the .05 level. t = 1.96.

** Significant at the .01 level. t = 2.59.

serve only those foods with which she is acquainted and is less likely to experiment or try new foods. This behavior pattern also affects the number of fruits and vegetables (fresh and dried) served, all of which show negative relationships with traditional management. The strong negative relationship with Mexican vegetables is unexpected since the sample contains no Mexican Americans. However, within the White population, the interest in Mexican food represents a relatively new trend and, therefore, would not be found in a traditional family.

Some of the basic need levels have significant effects. This is true primarily for physiological and self-actualization needs and, to a more limited degree, for love and belongingness needs. The negative relationship between physiological needs and the serving of fruit salads can be traced to the perception that these foods are not as essential to subsistence as are foods such as meat and potatoes. Since subsistence is the prime motivator at this need level, the former items may not be purchased by households responding to this need. The negative relationship with fresh cabbage is more difficult to explain, though it appears to be related to the serving of fewer salads. When served, cabbage is more likely to be part of the main or substantial (or only) course at the meal.

Some positive relationships are present among the need for love and belonging and various categories of fruit. These include the serving of fresh berries and of common canned fruits. Since the person at this level is motivated by the need to be a loved and needed member of the group, this homemaker may serve more fruits which are among the favorite foods of children.

Positive relationships are found between self-actualization need and the variety of both fruits and vegetables served and the serving of fresh berries and dried fruit. Several influences may be present here. Since an individual at this need level is concerned for all persons, variation in individual tastes and preferences is likely to be recognized. This can explain the larger number of types of fruits and vegetables served. Creativity is also likely to be present among persons with self-actualization needs; therefore, a greater number of gourmet type meals may be served. This can lead to use of a wider variety of vegetables, fruits, and berries. The concern with individual well-being, when associated with levels of income which enable one to be selective in purchasing, may explain the greater use of dried fruits.

Among the other socioeconomic variables, household size positively affects eight of the 18 factors and all five categories of the number of foods served. In terms of the number of dependent variables affected, it is the strongest explanatory variable. Larger households serve a wider variety of fruits and vegetables than do the smaller households. The increased number of individual preferences in the larger households appears to be the dominant contributing influence.

Education of the adult female is a relatively strong variable among the factors. Five of the 18 factors are significantly affected. Two of the three positive relationships are for fresh items, while both negative relationships are with canned and dried vegetables. This suggests that higher education leads to the consumption of more nutritious items. Education is also positively related to the number of fruits served.

Ownership of large food freezers positively affects all frozen items and dried fruit. There is some evidence that freezer ownership leads to the substitution of frozen for canned vegetables. The t-value for common canned vegetables is negative and significant at the .10 level (Table 3). Larger freezer ownership significantly increases the number of items served in three of the five categories. Freezer ownership appears to facilitate variety in the fruit and vegetable diets of households.

Households that regularly eat out serve a greater variety of all categories except dried vegetables. They consume more fruit items than other households. Four of the eight fruit factors show a positive significant relationship, but none of the ten vegetable factors do so. The special diet variable significantly

affects three factors, all of them fresh fruits or vegetables. This result is expected from the type of special diets encountered for reduced caloric intake or for diabetics. "Special diet" does not significantly affect the variety of fruits and vegetables consumed.

Occupation of the major earner is a relatively weak explanatory variable. White collar workers do consume more green vegetables, both in fresh and in frozen form, than do others. These vegetables are generally lower in calories and may explain this type of relationship. White collar workers also tend to eat more frozen and fewer canned vegetables.

Consumption associated with 6 of the 18 factors in central Washington differs significantly from that in the northern Seattle metropolitan area. Consumption of four of the eight fruit items is lower. Two of these items are berries. Central Washington is a major tree fruit area and, therefore, berry consumption may be low because of substitution of tree fruits for berries. The higher consumption of the "Mexican vegetables" among White households in the Central Region may be due to the influence on food patterns stemming from the large numbers of Mexican American families living in the area.

Summary and Conclusions

In this study of traditional and nontraditional variables influencing food consumption, the level of liquid assets held was found to significantly affect both the type and the variety of fruits and vegetables served by Washington households. Since food is an item usually purchased with cash, this finding suggests that households with low cash reserves may restrict the types and variety of fruits and vegetables purchased in order to control food expenditures. This result departs somewhat from the contention of Crockett that the propensity to consume from liquid asset holdings may not be higher for households with such holdings because these households have a higher propensity to save. In this study, the sample included only households with 8-12 year old children and the model included current income. These procedures help to hold constant differences in propensities to save that stem from differences in life cycle stages and income levels. This added control may account for the differences in results.

Sociopsychological variables depicting management style and psychological need levels also affected food consumption patterns. A traditional style of management was negatively related to both number and types of fruits and vegetables served indicating that these non-economic elements influence tastes and, thereby, demand for less familiar food items. Basic physiological and self-actualization needs were important in explaining preferences. Persons concerned with physiological well-being appear more likely to serve substantive basic foods and less likely to serve a wide variety of fruit and vegetable items.

Some variables traditionally conceived to explain consumption patterns were comparatively weak in explaining the types of fruits and vegetables consumed. Income and occupation were significant for only a few of the fruit and vegetable factors analyzed. Household size was, however, statistically the strongest variable in the study. Education, geographic area, and whether or not the household regularly eats out also affected consumption patterns.

Overall, the results of this study suggest that a number of non-traditional economic and sociopsychological factors affect fruit and vegetable consumption. More work is needed to accurately assess their full impact, however. In an era of growing awareness of the importance of proper human nutrition and concern over its determinants, investigations of a wider range of variables affecting consumption of foods may be justified.

References

Burk, Marguerite C. "Survey of Interpretations of Consumer Behavior by Social Scientists in the Post-war Period," *Journal of Farm Economics*, 49 (1967): 1-31.

Cheng, P. L. "Consumption of Nondurable Goods and Contractual Commitment of Disposable Income," *Review of Economics and Statistics*, (1963): 254-263.

Crockett, Jean. "Income and Asset Effects on Consumption: Aggregate and Cross Section," in *Models of Income Determination*, Studies in Income and Wealth, National Bureau of Economic Research, Princeton University Press, 1964.

Diesing, Paul. *Reason in Society*, University of Illinois Press, Urbana, 1962.

Drucker, Peter. *The Practice of Management*, Harper and Brothers, New York, 1954.

"Estimating Equivalent Incomes on Budget Costs by Family Type," *Monthly Labor Review*, 83 (1960): 1197-1200.

Ferber, Robert. "Consumer Economics, A Survey," *Journal of Economic Literature*, 11 (1973): 1303-1342.

Goldstein, Kurt. *The Organism*, American Book Co., New York, 1939.

Harvey, Carol. "Emotionality in Family Decision Making," unpublished Master's thesis, Washington State University, 1968.

Maslow, Abraham. *Motivation and Personality*, Harper and Row, New York, 1970.

Price, David W. and Donald A. West. "Socioeconomic and Demographic Characteristics of Washington Households with School Children by Ethnic Group and Poverty Level," Washington State University CARC Bull. 851, Aug. 1977.

Price, David W., Margaret M. Hard, Irwin Dyer, Madeline Mitchell, Dorothy Z. Price, Genevieve Scheier, and Donald A. West. "Evaluation of School Lunch and School Breakfast Programs in the State of Washington," final report to Food & Nutrition Service, USDA, 1976 (available on loan from National Agriculture Library, Beltsville, Maryland).

Price, David W. "Food Patterns in Washington Households with 8-12 Year Old Children," Washington State University CARC Bull. 843, May 1977.

Price, Dorothy Z. "Relationship of Decision Styles and Self Actualization," *Home Economics Research Journal*, 2 (1973).

Projector, D. S. "Consumer Asset Preferences," *American Economic Review*, 55 (1965): 227-251.

Rummel, R. J. *Applied Factor Analysis*, Northwestern University Press, Evanston, Ill., 1970.

Simon, Herbert. *The New Science of Management Decision*, Harper and Row, New York, 1960.

U.S. Bureau of Census, Census of Population, 1970. Volume 1, Part 49. U.S. Government Printing Office, Washington, D.C. p. 49-59.

Weber, Janice. "An Explanatory Study of Two Decision-Making Approaches," unpublished Master's thesis, Washington State University, 1971.

West, Donald A. "Effects of the Food Stamp Program on Food Expenditures," final report to the Food & Nutrition Service, USDA, 1979.

West, Donald A., and David W. Price. "The Effects of Income, Assets, Food Programs, and Household Size on Food Consumption," *American Journal of Agricultural Economics*, 58 (1976): 725-730.