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ABSTRACT

The Effects of Socio-Economic and Psychological Variables on
Types of Fruits and Vegetables Consumed*

By

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A factor analysis results in groups of fruits and vegetables that are similar in taste, texture, etc. Liquid assets significantly affect consumption for many fruits and vegetables. Traditional homemakers serve fewer fruit and vegetable items. Basic psychological need levels of the homemaker significantly affect consumption of certain fruits and vegetables.

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Introduction

Studies of consumer behavior concentrate on brand preference at one end of the spectrum and on the consumption of aggregates of commodities on the other, such as total food. There is little information on the socio-economic and psychological determinants of the consumption of specific food commodities. Theories of consumer behavior such as espoused by Burk (1967) list numerous determinants of consumption, but empirical studies usually collect data on relatively few explanatory variables. This study includes variables whose influence has not been or rarely been reported, including liquid assets, Maslow's need levels, and types of management practiced by the homemaker.

Jean Crockett posits two asset effects, ". . . a permissive effect, which becomes more important in the presence of negative transitory income . . . and an independent causal or motivating effect, which occurs only in the presence of asset disequilibrium and cannot be properly estimated until savings propensities can be measured, or at least held, relatively constant" (p. 113). This sample includes only households which have an 8-12 year old child.¹ This has the effect of holding the stage in the family life cycle nearly constant. It is hypothesized that life cycle stage has a strong influence on the propensity to save.

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

A second variable, "normal" income, was posited by Mrs. Crockett to affect the desire to accumulate assets. Normal income is defined as that which the household considers normal at a given point in time. It is similar but not identical to permanent income. This survey did not include sufficient data to be able to isolate normal from current income. It is expected that current income is also a measure of the propensity to save.

In the modern U.S., economy food is purchased almost entirely with cash, whereas other items may be purchased with credit cards with the possibility of delayed payments. Madden and Yoder, and West and Price have shown that the length of the pay period affects the amount spent on food. This is explained by the hypothesis that households run low on cash with which to purchase food at the end of a pay period. Under these conditions, the permissive effect of liquid assets on consumption posited by Mrs. Crockett would be expected to operate. Holding the propensity to save constant, households with liquid assets would spend for food out of these assets, whereas households with no liquid assets would decrease food purchases.

The effect of social psychological factors on consumption patterns has long been recognized. Specific consumer expenditures, as all behavior, 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 the basic deficiency needs up through higher growth-oriented needs. It is hypothesized that consumption of food represents a basic physiological need, but that consumption of any specific type of

food may be motivated by any need level and may differ according to the need level prevalent at a given time.

Family management encompasses many aspects of a family's life style and is strongly indicative of values to which family members are committed. A number of early management theorists identified two major types of decisions, which in turn prevail in different management styles. Drucker identifies routine and strategic decisions, while Simon discusses programmed and non-programmed decisions. Programmed and routine decisions relate most clearly to a traditional management style which is highly goal directed, objective and focused on economy and efficiency. The strategic and non-programmed decisions can be associated with a humanistic management style. In this approach, creativity, flexibility and an over-riding concern with each individual are emphasized. Studies by D.Z. Price and Weber clearly indicate one other style: organizational. In this style, emphasis is on the group as a whole; it is characterized by a pseudo-democratic environment, selective communication and resistance to change.

Although elements of traditional, humanistic and organizational management can exist for any person or group, generally, over time one style will be found to be predominant.

The sample used in the analysis includes 497 households containing 8-12 year old white children taken during 1972 and 1973. It was designed to be representative of white 8-12 year old children attending public schools in the State of Washington. White children comprise 92.1% of the state's school population. The sample does contain a higher percentage of below poverty children than does the state's population--31% in comparison with 12% (see Price and West).

The socio-economic and consumption data were gathered from interviews with the person in the household actually in charge of food preparation. Psychological need levels were obtained from a Q sort of 30 basic need statements from "most like you" to "least like you." Management styles were obtained from a forced choice test of 15 questions with three alternatives for each question which depict the three management styles.

Respondents were asked if they usually served (at least once every two weeks) broad categories of commodities such as frozen vegetables. If they answered in the affirmative, the interviewer asked what kinds and listed these. This did not give actual quantities or frequency of serving, but it measures the types and the variety of foods that make up the normal diet of the household.

Factor Analysis of Consumption Data

There were 49 different types of vegetables and salads and 28 different types of fruits served by 10% or more of the white households (for details on types and consumption by ethnic group, see Price 1977). In order to reduce the number of items to be analyzed and to attempt to find groups of fruits and vegetables with similar preferences, a factor analysis was made of the individual items. If a household has a strong preference for an individual food item, they should have a relatively high preference for and also consume items with similar flavor, texture, etc. . If, for example, a household has a high preference for cauliflower, they would also be expected to consume broccoli and brussel sprouts. Factor analysis of the variables representing whether or not the food item is usually consumed would group items with similar flavor, texture, etc. Items within these food groups should be close substitutes.

To reduce the bias in the correlation coefficients from using dummy variables whose mean values differ substantially from .5, all fruit and vegetable items consumed by over 85% or less than 15% of the sample were excluded from the analysis, leaving 65 items.² These excluded items are of minor importance to this analysis because either nearly all households consume or very few households consume them.

The factor analysis consisted of first extracting principal components, then rotating by the variance criterion. All components with eigenvalues greater than one were retained, yielding 23 components which accounted for 62.4% of the variance of the original 65 variables.

Generally the factors consist of fruit and vegetable items that are similar in taste, texture, etc. (Table 1). Most factors contain items similar enough so that interpretations of and naming of the factors is relatively easy.

The Regression Models

Eighteen of the 23 factors were regressed with socio-economic and psychological variables by weighting the most important variables by the square of the factor loadings (see Rummel, p. 441). In addition to liquid assets, need levels and management styles, the explanatory variables included current income, occupation, household size, education of the adult female, geographic area within the state, and freezer ownership. Households that regularly eat out as a group and households where someone is on a special diet were identified and included in the regression model with the use of dummy variables.

Household income is the sum of annual earnings plus transfer payments. Both income and assets were put on an adult equivalent scale by the use of the income scales given in the 1960 Monthly Labor Review.

²This bias may lead to difficulty factors. See Rummel, pp. 303-305.

Table 1. Factors for 65 Fruits and Vegetables

Factor	Individual Foods ^a (Factor Loadings in Parentheses) [Sample Means in Brackets]
1. Fresh Tree Fruit	Fr. Peaches (.764) [.58] Fr. Pears (.719) [.46] Fr. Cherries (.576) [.34] Fr. Apricots (.486) [.16] Fr. Plums (.484) [.31]
2. Melon	Fr Cantaloupe (.699) [.46] Fr. Watermelon (.569) [.75] Fr. Grapefruit (.363) [.23] Can. Pineapple (.338) [.34]
3. Fresh Berry	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 (.321) [.46]
5. Other Canned Fruit	Can. Apricots (.685) [.22] Can. Cherries (.625) [.17] Can. Prunes & Plums (.427) [.18] Fr. Apricots* (.447) [.16]
6. Frozen Berry	Fr. Strawberry (.702) [.56] Fr. Raspberry (.586) [.32]
7. Dried Fruit	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 Cucumber	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. Brussel 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

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

^bThis factor was so varied because the items with the highest 2 loadings are served by a high percentage of Mexican American households (See Price 1977). Thus, White households serving these items would be serving Mexican foods.

The types of food that a household finds to be low cost and easy to serve may vary with size. In addition, the larger household must take into account a larger number of individual preferences when making choices as to types of food than the smaller household. Education and occupation reflect the social class with which the household associates and through which the types of food served may be affected. Education may also affect the types of food served via a knowledge of nutrition. Occupation also may influence the type of food served through the amount of physical activity of the major wage earner.

The climate and the population concentrations of the State of Washington are quite varied. It is expected that climate affects the type of food consumed. Inclusion of the geographic area allows the model to measure effects due to climate. Geographic area also measures the types of food readily available at low cost due to proximity to production and the ease of home production, plus influences due to rural-urban differences (see Burk 1968, p. 166).

Freezer ownership enhances the household's ability to store home production, or food purchased at low prices during harvest time. This may alter the types of food consumed since some foods can be purchased or produced easier and/or more cheaply than others.

Households that regularly eat out as a group are exposed to the different types of food served by restaurants. This exposure may alter the household's consumption. Persons of special diets may alter the types of food served. The special diets encountered in this survey were mostly either low calorie or diabetic.

The strongest variables in terms of being significant the largest number of times (eight) were household size and liquid assets (Table 2). The signs on both these variables were positive for all items which

Table 2. Relationship between Fruit and Vegetable Consumption and Socio-Economic and Psychological Variables

	Fresh Tree Fruit	Fresh Melon	Fresh Berry	Common Canned Fruit	Other Canned Fruit	Frozen Berry	Dried Fruit	Fruit Salad
	----- t values -----							
Income	N	N	N	N	-2.84**	-1.45	-1.87	-1.51
Liquid Assets	2.32*	N	2.70**	1.95*	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	-1.80	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 2. Continued

	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	Macaroni & Potato Salad	Mexican Veg's	No. of Items with Significance
----- t values -----											
Income	-2.26*	-1.34	N	N	N	N	N	N	N	-2.29*	3
Liquid Assets	3.93**	2.38*	1.56	1.10	N	N	N	N	N	N	8
Management Type											
Traditional	N	N	N	N	N	-1.40	-1.31	-2.79**	-1.19	-2.67**	5
Humanistic	N	N	1.75	N	N	N	-1.00	N	1.34	N	0
Need Level											
Physiological	N	-1.35	-1.96*	N	N	N	N	N	-1.16	-1.46	2
Love & Belonging	1.32	1.05	N	N	N	N	N	N	1.19	N	2
Self Esteem	N	-1.00	N	N	N	N	N	1.75	N	N	0
Self Actualization	N	1.59	N	1.54	N	N	1.38	1.55	N	N	2
Occupation											
White Collar	N	N	N	2.40*	-1.51	2.10*	3.34**	N	N	1.68	3
Armed Forces	1.87	N	N	N	1.15	N	N	N	2.28*	1.01	2
Service	N	N	N	N	N	N	N	N	N	N	2
Household Size	3.30**	4.31**	4.26**	N	1.05	1.90	N	2.21*	1.95	2.01*	8
Education of Adult Female	N	2.40*	1.19	1.16	-2.09*	1.85	N	N	N	-3.84**	5
Household Eats Out	N	N	N	N	1.64	N	1.08	N	N	N	4
Anyone on a Special Diet	2.32*	N	1.55	N	-1.94	N	N	N	-1.11	1.08	3
Own Large Freezer	N	1.78	-1.45	N	-1.65	3.02**	3.07**	1.37	N	N	4
Geographic Area											
Eastern Washington	N	-1.58	N	N	2.82**	N	N	1.59	N	1.59	1
Central Washington	-2.42*	N	N	N	1.08	-1.70	N	N	N	2.63**	6
Northwestern Washington	-2.03*	-1.67	N	3.09**	1.22	-1.93	N	1.45	-1.36	N	3
South Metro Washington	-2.60**	-3.14**	-1.38	N	1.04	N	N	-1.24	-1.36	-1.90	2
R ²	.091	.144	.090	.110	.067	.080	.086	.084	.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

shows that they both lead to a wider variety of fruit and vegetable items consumed, and possibly to a greater total consumption of fruit and vegetable items.

Liquid assets affected most of the fruit items and the fresh vegetable items, but not processed vegetables. This indicates that perishable commodities are sensitive to the amount of cash reserves held by a household. One possible reason for the processed fruits being affected is that they are viewed as non-essential "dessert type" items which are not purchased when cash reserves are low.

Current income significantly affected only three factors (Table 2). In contrast to liquid assets, all relationships were negative. The negative relationship with the Mexican vegetable factor is expected since these are inexpensive items. The negative relationship with fresh garden vegetables is plausible if high income groups are less inclined to raise gardens. A high propensity to save appears to be related to having a garden since liquid assets have a positive relationship with this factor. The explanation for the negative relationship between income and the other canned fruit factor is not obvious.

The value of the food consumed was not included in these models. The more expensive fruit and vegetable items should be highly correlated with this variable. The correlation matrix shows little correlation between value of food consumed and the 18 fruit and vegetable factors. Thus, households consuming the high cost fruit and vegetable items may offset that cost by purchasing cheaper types of other foods.

Traditional management is a relatively strong explanatory variable. All significant relationships were negative. This relationship can be expected since the traditional homemaker is likely to continue to serve

only those foods with which she is acquainted; she is less likely to experiment or try new foods. A limited number of familiar fruits and vegetables are likely to be served in this type of household. At initial glance, the strong negative relationship with Mexican vegetables is unexpected. However, in the white population the interest in Mexican food represents a relatively new trend and, therefore, would not be found in a traditional family.

Several of the basic need levels were significant. Physiological need was negatively related to fruit salad and to fresh cabbage. The negative relationship between the fresh cabbage and physiological need likely exists because this is used as a salad and salads are not perceived as necessary for subsistence. Households with high physiological needs would emphasize foods needed for subsistence.

Some significant positive relationships were present between the need for love and belonging and various categories of fruit. These included fresh berries and common canned fruit. Since the person at this level is motivated by the need to be loved, this homemaker may serve more fruits since they are among the favorite foods of children.

Other variables significantly affected fruit and vegetable consumption. For the sake of brevity, their effects will not be discussed.

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