LINKAGES BETWEEN SOCIOECONOMIC CHARACTERISTICS, FOOD EXPENDITURE PATTERNS AND NUTRITIONAL STATUS OF LOW-INCOME HOUSEHOLDS: A CRITICAL REVIEW*

by

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INTRODUCTION

The positive gains made in the development of a national food policy have occured within the context of intense political debate on a number of policy issues. These issues often involve the amount of expenditures in food assistance programs, willingness to sustain program associated income transfer benefits, impact of the program on food costs, participation, program abuse, and the magnitude of program impact on food consumption patterns and nutritional status of beneficiaries.

The high propensity for debate on food policy issues, and the recent public sector retreat from support of food assistance and other entitlement programs, are related to the political economics of welfare subsidies. The political feasibility for sustaining welfare subsidies requires that the recipients use the subsidies in ways consistent with the preferences and goals of those giving the subsidies (Daly, and Giertz;Giertz,and Sullivan).

Food assistance programs are predicated on the notions that: (a) satisfactory nutrition cannot be maintained unless appropriate food is available and consumed, (b) segments of the population face high nutrition risks because socioeconomic circumstances (primarily economic) limit their access to and effective utilization of adequate food and (c) benefits of food assistance should be based primarily on need (U.S. Congress, Joint Committee Hearing on National Nutrition Status Monitoring System, p. 83). Within the context of food and nutrition policy goals, these notions subsume a number of significant linkages between household socioeconomic characteristics, food consumption patterns, and nutritional status.

Economists have identified and estimated the behavioral and distributive responses of food and nutrient consumption to variations in household socio-economic characteristics. More comprehensive data sets relating to national food consumption patterns and associated nutritional status and theoretical and econometric advances have improved research. Yet, there is no consensus on the type and magnitude of the economic linkages of household variables. The objective of this paper is to review and appraise the literature on this aspect of consumer behavior, particularly as it relates to low-income households. By identifying the nature, magnitude, and direction of these relationships, insight can be gained into the potential impact of food policy changes on this segment of the population.

THEORETICAL ISSUES

The ideas that underline domestic food and nutrition programs indicate that the realization of program goals is related to assumptions about economic linkages in low-income households. However, from a conceptual point of view, how plausible are these dynamic economic linkages that are assumed to exist between household economic characteristics, food expenditure patterns and nutritional status? A brief review of the literature is presented as background with regard to this question.

Food Expenditure

Traditional consumer demand theory addresses socioeconomic-food expenditure linkages through the Engel demand curve, which is a functional linkage between household food expenditure and the income of the household, in a given time period. Since prices, tastes, and preferences and the number of consumers are assumed constant, the Engel curve shows how purchases of food commodities change when money income changes. The slope of the Engel curve measures the income elasticity of expenditure for food. A positive, negative and zero elasticity implies normal, inferior and neutral goods,

respectively. The general Engel relationship is embodied in Engel's law which asserts that the lower the family money income the greater the percentage of that income spent for food.

Traditional theory does not include household sociodemographic characteristics in postulation of the Engel relationship. The theory is based on the assumption that the consumer unit attempts to maximize utility from the services of goods purchased in the market place, in a single period, subject to a money income constraint. A large part of the theory is based on given differences in tastes and preferences rather than explaining how tastes and preferences are formed and the ability to predict their effect. Also, the theory is generally restricted to the market subsector, where transactions are evaluated in terms of monetary prices and income. Transaction activities that are directed at utility maximization via the allocation of household resources to competing nonmarket factors are not accounted for by the theory. Such nonmarket socioeconomic factors as family size, age, race, religion, sex, education and life cycle parameters, to name a few, are not explicitly postulated to affect food expenditure patterns. These factors are assumed to enter the expenditure function through the proxy variable "taste and preference" (Becker; Lancaster).

The assumption that money income is the major determinant of food expenditure patterns and the failure to explicitly include socioeconomic variables as important determinants of expenditure behavior reduce the predictive ability of traditional theory in real world situations. Indeed, the major focus of the main body of policy oriented studies has been on the impact of an additional dollar of food assistance transfers, such as food stamps, on food expenditure levels of low income households (USDA/ESCS).

The status of socioeconomic variables in traditional demand theory has

been described by Ferber as ". . . the stepchildren of consumption theory" (p. 1332). Attempts to effectively integrate household socioeconomic factors into traditional consumer demand theory have been modest. The most successful contribution to the theory in this area has been the development of the life cycle concepts in the 1950s and "household economic theory" in the 1960s (Ferber; Becker; Lancaster).

The contribution of household economics to traditional consumer theory has been to extend the applicability of traditional demand theory to real world situations by permitting the explicit incorporation of nonconventional household characteristics into the Engel demand function. There is some question, however, whether this contribution to the theory of consumer behavior has had any significant impact on the shaping of the conventional wisdom.

Nutritional Status and Food Expenditure

Within the context of traditional consumer demand theory the linkages between household socioeconomic characteristics and nutritional status are not made explicitly. Nutrient demand relationships are not addressed, but it is implied that an increase in food expenditure automatically improves nutritional status. Since the primary determinant of expenditure is money income, it follows that the income elasticity and associated marginal propensity to consume nutrients would be critical relationships. These income-expenditure-nutrient relationships appear to be also subsumed in the prevailing notions behind the operational mechanisms of domestic food assistance programs, particularly the Food Stamp Program. A major objective of the Food Stamp Program (FSP) is to supplement the food budget of low-income households, and enhance the households' ability to gain access to a nutritious food supply (Longen; Sexauer 1981). Thus the FSP is the only food assistance program that explicitly incorporates the income-expenditure relationship along with nutritional considerations.

The FSP as a means-tested program, is both a minimum provision and an efficiency of investment program. The minimum provision is intended to assure an adequate supply of food to needy families, and the efficiency aspect seeks to increase the nutritional status of populations deemed to be at nutritional risk. However, the test of efficiency becomes greater as you move in the direction of nutritional impacts. Recognition that nutritional status is dependent upon factors other than food intake has received increased attention in recent years (Blanciforti, Green, and Lane; Davis, Moussie, Dinning,and Christakis; Sanderson; Sexauer 1978). The conceptual linkages of traditional consumer demand theory with other socioeconomic characteristics in the study of nutritional status have been significantly increased by household economic theory. In addition to explicitly permitting the incorporation of socioeconomic variables into the Engel demand curve, the theory permits a plausible conceptual linkage between food intake and nutritional status. Since household economics merely extends, rather than refutes the intrinsic utility maximization properties of traditional demand theory, the Engel relationship postulated between socioeconomic characteristics, food expenditure and nutritional status is consistent with traditional theory.

Household economic theory views the family as essentially a firm, while traditional theory views the individual members of the family as the firm. Within the family (firm) unit it is the characteristics of consumption goods which provide utility, rather than goods per se. Thus utility is defined in "characteristics space" rather than in "goods space". Furthermore, a single good can possess multiple characteristics. Combinations of goods may possess characteristics different from those of goods used singularly (Lancaster). Household theory has been extended by Becker where goods and their associated characteristics are viewed as inputs in the family production function. The

commodities produced through the productive system are the final output and these outputs are the utility function arguments. Conceptually, household food intake (expenditure) can be linked to household nutritional status in the "new" framework by viewing nutrient characteristics of food and associated health status as the arguments of utility. Thus in food assistance programs, such as the Food Stamp Program, income supplement via bonus stamps permit low-income households to purchase food items with higher nutrient contents. Higher levels of nutrients provide higher levels of physical well-being and hence higher levels of utility. Since household socioeconomic characteristics affect the nature of the family production, they enter the demand function for nutrients.

EMPIRICAL FINDINGS

In spite of some significant gaps, major strides have been made in the applied economic literature in the identification and quantification of household socioeconomic, food expenditure, and nutritional status linkages. Recent empirical research has been facilitated by: (a) improved theoretical underpinning (b) increased interest and support for food policy research, and (c) an improved national data base for domestic food and nutritional programs. The improved scope and design of the USDA's household food consumption data series are excellent examples of this improved information base. The USDA's data tapes from the 1977-78 Nationwide Food Consumption Survey (NFCS) were made available for public use in 1980. The National Food Consumption Survey, officially entitled "Survey of Food Consumption of Low-Income Households, 1977-78", represents the first comprehensive national data source available for empirically ascertaining the impact of food assistance programs on food expenditure and nutrient intakes of low-income households (Johnson, Burt, and Morgan). The 1977-78 NFCS data series

complements and extends other food consumption data sets obtained from other national and regional surveys.

Some of the principal empirical studies are summarized in Table 1. The studies reviewed are not intended to represent the universe of such studies. Selection was based primarily on theoretical and methodological relevance to the focus of the paper. No attempt is made to evaluate the implications of the methodological and statistical properties of the studies. These are issues that can be better handled elsewhere.

In reviewing the scope of these studies the one characteristic which stands out is the tendency to separate analysis of household food expenditure from analysis of nutritional status. Of the 18 studies reviewed, six had a joint expenditure-nutritional status focus, 13 had an expenditure focus, and 11 had a nutritional status focus. It would appear, therefore, that the theoretical linking of goods consumption (characteristics) to household utility has not been fully exploited in empirical work.

In general, the determinants of food expenditure and nutritional status can be classified as economic and sociodemographic factors.

Economic Factors

The only economic factors that are common explanatory variables to both food expenditure and nutritional status analyses are money income and food stamp bonus income. In the case of food expenditure, six studies reported money income as having a positive and significant impact. In addition, two studies reported the money income variable as having a "significant" impact (positively or negatively), depending on the particular characteristics of subgroups (Salathe, and Buse; Gallo, Salathe, and Boehm). Bonus food stamp income was reported as having a significantly positive effect on food expenditures in seven studies. However, one study (Madden, and Yoder) reported a nonsignificant impact for this variable.

Table 1. Selected Empirical Studies on Food Expenditure, Nutritional Status and Socioeconomic Linkages

Study	Population	Data Base and Model Specification	Summary Statistical Results	
			Food Expenditure Impact	Nutritional Status Impact
Madden - Yoder (1972)	Pennsylvania low-income households	Primary survey data (1969 - 1970). Linear OLS regression models, with continuous and discrete variables.	Bonus food stamp income nonsignificant.	Bonus food stamp income negatively significant. Homemaker's age negatively significant. Frequency of income receipt negatively significant. Income positively significant.
Adrian - Daniel (1976)	U.S. low-income households	National food consumption survey data (USDA, 1965 - 1966). Quadratic regression models, with continuous and discrete variables.	NA[a]	Income positively significant (weakly). Residential location significant.[b] Race significant. General education of homemaker significant. Life cycle significant. Family size significant.
West - Price (1976)	Washington low-income households	Primary survey data (1972 - 1973). Double logarithmic regression models, with continuous and discrete variables.	Bonus food stamp income positively significant. School lunch positively significant. Income positively significant. Length of pay period negatively significant (weakly).	NA
Neenan - Davis (1977)	Florida rural low-income households	Primary survey data and EFNEP records (1976). Linear OLS regression models, with continuous and discrete variables.	Income positively significant. Family size positively significant. Bonus food stamp income interact positively with family size. Bonus food stamp interact negatively with income.	NA
Lane (1978)	California low-income households	Primary survey data (1972 - 1973). Tobit models, with dependent variables in regression model having a lower or upper limit.	Bonus food stamp positively significant. Commodity distribution positively significant.	Food expenditure positively significant.
Price - West - Scheier - Price (1978)	Washington low-income school children	Primary survey data (1971 - 1973). OLS regression models, with linear and nonlinear continuous and discrete variables.	NA	Household assets positively significant. School lunch positively significant. Food expenditure nonsignificant. Bonus food stamp income nonsignificant.

Table 1. (Continued)

Davis - Neenan (1979)	Florida rural low-income households	Primary survey data and EFNEP records (1976). Linear OLS regression models, with continuous and discrete variables.	Bonus food stamp income positively significant. Nutrition education positively significant.	Bonus food stamp income positively significant. Nutrition education positively significant. Bonus food stamp income interact positively significant with nutrition education. Bonus food stamp income and money income not consistent across nutrients.
Scearce - Jensen (1979)	Southern low-income households	National consumer expenditure survey (BLS, 1972 - 1974). Double logarithmic regression model, with discrete variables.	NA	FSP participation positively significant. Income positively significant. Homemaker's education positively significant.
Salathe - Buse (1979)	U.S. households	National food consumption survey (USDA, 1965 - 1966). OLS regression models, with linear and nonlinear continuous and discrete variables.	Income significant. Residential location significant. Education level of homemaker significant. Employment status significant. Life cycle stage significant. Age-sex composition significant.	NA
Callo - Salathe - Boehm (1979)	U.S. households	National food consumption survey (BLS, 1972 - 1974). Linear OLS regression model, with continuous and discrete variables.	Age of homemaker significant. Income significant.	NA
Salathe (1980)	U.S. low-income households	National consumer expenditure survey (BLS, 1972 - 1974). OLS regression model, with linear and nonlinear continuous and discrete variables.	Residential location significant. Race and household composition significant. Bonus food stamp income positively significant.	NA
Smallwood - Blaylock (1981)	U.S. households	National food consumption survey (USDA, 1977 - 1978). Quadratic regression model, with continuous and discrete variables.	Income positively significant. Household size positively significant.	NA

Table 1. (Continued)

Blanciforti - Green - Lane (1981)	U.S. households	National consumer expenditure survey (BLS,1972 - 1974).Box-Cox flexible regression model, with continuous and discrete variables.	Life cycle stage significant	Life cycle stage significant.
Johnson - Burt - Morgan (1981)	U.S. low-income households	National food consumption survey (USDA,1977 - 1978).OLS regression models with linear and nonlinear continuous and discrete variables.	Income and bonus food stamp income positively significant.Residential location significant.	Bonus food stamp income positively significant.Residential location significant.
Davis - Moussie - Dinning - Christakis (1982)	Florida low-income households	Primary survey data (1979 - 1980). Double logarithmic regression models,with linear and nonlinear continuous and discreet variables.	Income positively significant.Family size positively significant.FSP participation positively significant.Educational level nonsignificant.Nutritional education significant.	NA
Davis - Moussie - Bailey - Wagner (1982)	Florida low-income adolescents	Primary survey data (1979 - 1980). Linear OLS regression models,with continuous and discrete variables.	NA	Income nonsignificant.FSP participation nonsignificant.Household size,homemaker's age and race nonsignificant.Homemaker's educational level nonsignificant.Homemaker's nutritional education significant.Sex significant.
Sanderson (1982)	Florida low-income elderly households	Primary survey data (1977).Linear OLS regression models,with continuous and discrete variables.	Income positively significant.Bonus food stamp income positively significant.Subsidized housing positively significant. Congregate meals negatively significant.	Food expenditure nonsignificant.Nutritional education significant.Sex significant.
Allen - Gadson (1982)	U.S. households	National food consumption survey (USDA,1977 - 1978).Double logarithmic regression models, with linear and nonlinear continuous and discrete variables.	NA	Food expenditure significant.Residential location significant.Race of homemaker significant.Life cycle stage significant. Sex of homemaker significant.Educational level of homemaker significant.

[a]NA = Nutritional impact not analyzed.

[b]Significant impact could be either positive or negative.

In three studies, money income had a positively significant impact on the nutritional status of low-income households (Madden, and Yoder; Adrian, and Daniel; Scearce, and Jensen). One study (Davis, Moussie, Bailey, and Wagner) reported no significant impact of money income on nutritional status. The latter study utilized biochemical nutrient parameters, rather than nutrient intake parameters, as measurements of nutritional status. Nutritional status criteria are different in the two approaches. Also, three studies reported bonus food stamp income as impacting positively and significantly on nutritional status (Davis, Neenan; Scearce, and Jensen; Johnson, Burt, and Morgan). In contrast, one study reported a nonsignificant impact of bonus food stamp income on nutritional status (Price, West, Scheier, and Price), and another study reported a negative impact (Madden).

The empirical literature presents fairly strong evidence to support the theory that the income variable is a major determinant of household food expenditures. There is also some evidence of a positive relationship between income and nutritional status. However, the evidence is not as strong as that of the expenditure relationship. The elasticity of nutrients, with respect to income vary widely across nutrients (Madden, and Yoder; Adrian, and Daniel; Scearce, and Jensen; Johnson, Burt, and Morgan; Davis and Neenan). Income-nutrient response varies, depending on the type and degree of interaction between different income variables, and between income variables and other variables (Davis, and Neenan). Examples of the interactive effects of variables on nutritional status are those found between money income and bonus food stamp income, and between bonus food stamp income and nutritional status. Food stamp bonus income is an "in-kind" income transfer which affects both the level and food quality purchases from money income. Food stamp bonus income increases household "discretionary" money income, which can be used to meet nonfood

needs or food needs in excess of those met by food stamp coupons (Adrian, and Daniel; West, and Price; Neenan, and Davis; Lane; Davis, and Neenan; Johnson, Burt, and Morgan). There is some evidence suggesting that increased discretionary income might be used to purchase less nutritious food (Madden, and Yoder). In such cases, the empirical results indicate that interaction of discretionary income and household income could have a negative effect on nutritional status. On the other hand, bonus food stamp income could interact with nutritional knowledge to have a positive effect on nutritional knowledge to have a positive effect on nutritional status (Davis, and Neenan; Sanderson; Davis, Moussie, Bailey, and Wagner; Davis, Moussie, Dinning, and Christakis).

The literature suggests that improved nutritional status via food expenditures is not automatic as postulated in traditional theory. Rather, the impact is dependent on the nutritient composition of the expenditure items. This observation is borne out by the fact that two studies found expenditures to have a positive and significant impact on nutritional status (Lane; Allen, and Gadson), while two studies found a nonsignificant impact (Price, West, Scheier, and Price; Sanderson). For the same reasons, the evidence that assets impact positively on nutritional status (Price, West, Scheier, and Price) is also weak.

Sociodemographic Factors

The evidence is strong that household sociodemographic characteristics are important determinants of food expenditures and nutritional status. Household size was found to have a significantly positive impact on aggregate household food expenditures in three studies (Neenan,and Davis;Smallwood,and Blaylock;Davis,Moussie,Dinning,and Christakis). One study also reported evidence of economies of size with respect to food expenditures (Davis,Moussie, Dinning,and Christakis). The general educational level of the homemaker was found to have a positively significant impact on expenditures in one study

(Salathe, and Buse), and a nonsignificant impact in another study (Davis, Moussie, Dinning, and Christakis). Two studies found that the nutritional knowledge of the homemaker exerts a significantly negative impact on food expenditures, but a significantly positive impact on nutritive status (Davis, and Neenan; Davis, Moussie, Dinning, and Christakis). The different direction of the expenditure and the nutrient status impact was attributed to increased efficiency in food procurement on one hand, and the selection and preparation of more nutritious meals, on the other hand. Also, factors such as rural-urban location, life-cycle stage, and age-race-sex composition were found to exert significant impacts (negative or positive) on food expenditures.

The empirical evidence is strong that sociodemographic factors are important determinants of household nutritional status. The general educational level of the homemaker was found to have a positively significant impact on nutritional status in three studies (Scearce, and Jensen; Adrian, and Daniel; Allen, and Gadson). Three studies reported that the nutritional knowledge of the homemaker had a positively significant impact on nutritional status (Davis, and Neenan; Davis, Moussie, Bailey, and Wagner; Sanderson). One of these studies (Davis, Moussie, Bailey, and Wagner) reported that, unlike nutritional education, the general educational level of the homemaker had a nonsignificant impact on nutritional status. Residential location also appears to be an important determinant of nutritional status. This variable was found to have a positively or negatively significant impact, depending on the specification of the location variable, in three studies (Adrian, and Daniel; Allen, and Gadson; Johnson, Burt, and Morgan). Race and sex were also found to have positively or negatively significant impacts on nutritional status in four studies (Adrian, and Daniel; Allen, and Gadson; Davis, Moussie, Bailey, and Wagner; Sanderson).

CONCLUSIONS AND IMPLICATIONS

Continued public sector support for food assistance programs will increasingly be dependent on the degree to which such programs are recognized as moving the nation towards stated food and nutritional goals. However, from a policy standpoint, goal achievement only becomes meaningful when evaluated within the context of the operational efficiency of policy instruments. To the extent that food and nutrition program mechanisms subsume certain linkages between program recipients' socioeconomic characteristics, food expenditure patterns, and nutritional status, these linkages are important for policy impact analysis. The objective of this paper was to review and appraise the literature on these linkages, with special reference to low-income households.

The empirical literature strongly supported the notion that the income position of households is a major factor determining food expenditures. To the extent that food assistance programs, such as the Food Stamp Program, enhance the income position of low-income households, food expenditure outlays are increased. There is some question, however, regarding any direct linkage between the food expenditure-income impact and improved nutritional status. There is strong evidence suggesting that other socioeconomic factors interact with the income-food expenditure relationship to condition household nutritional impact. Specifically, the sociodemographic characteristics of households serve as a "screening apparatus" which affects both the direction and the degree of the "secondary" nutrient response to expenditure changes. The notion of a "secondary" nutrient response is important, since it suggests a time-lag between actual food consumption and improved physical well-being. A major shortcoming of the empirical literature is the failure to recognize the fact that nutritional status is a physiological condition which has a time dimension. With the exception of two studies (Davis, Moussie, Bailey, and Wagner; Sanderson), all of the nutritional impact assessments were based on food intake criteria, rather than on biochemical nutrient criteria. This is

a major shortcoming of the empirical studies, since nutrient intake criteria does not provide an adequate assessment of the long-term nutrient stores of target populations.

A number of policy implications are suggested by the findings. First, it is imperative that the sociodemographic characteristics of target populations be recognized and explicitly programmed into policy instruments. For example, given the strongly positive interactive effect of household income and nutritional education on nutritional status, food assistance programs should include a nutrition education component. The nutrition education requirement for FSP participants was written into the 1977 Food and Agriculture Act, but was never made operational. In the face of the empirical evidence, it appears that program mechanisms are moving away from this policy instrument. This movement is demonstrated by the fact that the 1981 Agriculture and Food Act changed the FSP nutrition education requirement to a discretionary authorization for the Secretary of Agriculture to use the program. If nutrition objectives are retained as a major component of the FSP, this decision should probably be reevaluated in light of empirical findings.

A second policy implication is that geographical and racial disparity in program impacts must be taken into account when program changes are contemplated. Geographical location and racial background are important determinants of household food expenditure and nutritional status. Certain geographical regions, such as the South and Southwest, contain a disproportionate number of the nation's economically disadvantaged and racial minorities. These regions and populations receive disproportionate adverse effects during high rates of inflation and during recessions. The current decision to balance the federal budget has given rise to actual and proposed reductions in entitlement programs, including food assistance programs. In general, food assistance benefits are being reduced via changes in

eligibility criteria. If these changes effectively remove large numbers of geographically and racially concentrated poor and near-poor populations from receipt of program benefits, these populations could experience significantly higher economic welfare losses than other segments of the population. Part of these welfare losses would come in the form of increased nutritional risk and morbidity, among a population that already has a high incidence of such occurences.

There are also a number of implications for U.S. food and nutrition policy research. One implication relates to the necessity of broadening the theoretical and methodological base of food policy research. Applied economic research has not fully exploited the theoretical contributions of household economics in effectively linking food expenditure and household socioeconomic characteristics to nutritional status. To the extent that poor data base might have been a constraint to this type of analysis, recent improvements in the data base offer unprecedented opportunities for more enlightened policy research. Also, it is obvious that food expenditure and nutritional status relationships are too complex a subject to be adequately analysed by a single discipline. Informative food and nutrition research will increasingly require multidisciplinary collaboration among nutritionists, economists, and other social scientists. The heavy reliance on nutrient intake parameters, as a criteria of nutritional status, is a major weakness in previous studies. Collaborative research, by economists and nutritional scientists, could facilitate the development of improved nutritional status criteria and facilitate the development of improved eco-nutrition policy analysis.

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