B-1717
August 1994

Texas Agricultural Experiment Station
The Texas A&M University System

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Bulletin 1717

Effect of Socioeconomic and Demographic Factors on Away-From-Home and At-Home Consumption of Selected Nutrients

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KEYWORDS: nutrient consumption, food away from home, food at home, socioeconomic and demographic factors, demand analysis.

The authors wish to thank Karen Kubena, Stephen Fuller, Dan Padberg, and R. Marie Jones for their helpful comments and suggestions.

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Executive Summary

The objective of this research is to determine the factors affecting individual intake of nutrients derived from either all food, food away from home (FAFH), or food at home (FAH). Such an evaluation provides a means of assessing the nutritional or dietary quality of American diets as well as provides a comprehensive description and understanding of nutrient consumption patterns not only from total food consumption but also from FAFH and FAH. The data used in this study is the Individual Intake phase of the 1987-88 National Food Consumption Survey of the United States Department of Agriculture. The information derived from this study is useful for nutrition educators and policy makers in focusing their nutrition education programs and dollars in both the FAFH and FAH markets.

The results of this study generally indicate that average nutrient intakes from FAFH are lower than average nutrient intakes from FAH except for fat, saturated fatty acids, monounsaturated fatty acids, and polyunsaturated fatty acids. Interestingly, the results also indicate that roughly 30 percent of the food energy kilocalories comes from FAFH, while the remaining 70 percent comes from FAH. These results have important implications for the away-from-home food industry. The fast food industry, for instance, has been criticized for serving foods that are "unhealthy" because of high fat content. An example would be a fast food meal of a hamburger, french fries, and milkshake, which contains approximately half the recommended dietary allowance (RDA) of calories and protein for the adult male but supplies only about one-third of the RDA of vitamin C, thiamin, and niacin, and even lesser amounts of iron, calcium, vitamin A, and riboflavin (Putnam and Van Dress, 1984).

Concern about health and fitness has encouraged consumers to prefer foods perceived as "fresh" and "light." In a 1988 Gallup poll conducted for the National Restaurant Association (1988), almost 60 percent of adult consumers claimed to be very interested in nutrition-conscious menu items in the away-from-home industry. As more consumers demand menu items with improved nutritive value, FAFH operators, to stay competitive, will have to adapt to these nutrition-conscious patrons. Some of the fast food chains, however, have started to respond positively to the demand of the customers for healthier and low-fat food. An example of this is McDonald's, which recently unveiled their 91 percent fat-free McLean Deluxe burger.

Individuals residing in suburban areas have slightly higher intakes of most of the nutrients analyzed from FAFH as a percentage of the RDA than do individuals residing in central cities or nonmetro areas. Likewise, individuals from the South have slightly higher intakes of most nutrients from FAFH as a percentage of the RDA than do those from other parts of the country. Others having higher intakes from FAFH as a percentage of the RDA are the following: employed individuals compared with unemployed individuals; nonfood stamp recipients compared with food stamp recipients; and those who are not on special diets compared with those who are. Across all sex and age groups, the average intake of nutrients from FAH is generally 50 percent or more of the RDA. Except for the intake of calcium and magnesium by certain population groups, the individuals in the sample seem to have generally acquired at least two-thirds of the RDA from all foods.

The nutrient consumption regression models have also disclosed some interesting results. For instance, individuals who reside in central cities or suburban areas consume lower amounts of fat and the various fatty acids per 1,000 kilocalories from FAFH than do individuals who reside in nonmetro areas. Significant regional differences are also evident in the consumption of various nutrients from FAFH. For example, individuals from the South seem generally to consume higher amounts of various nutrients except alcohol from FAFH but less from FAH than do individuals from other regions of the United States. Evident in the results is the positive relationship between the weight of an individual and the consumption of various nutrients from FAFH.

Employed individuals consume more of various nutrients except alcohol and dietary fiber away from home than do unemployed individuals. In contrast, employed individuals generally consume less of various nutrients at home compared with unemployed individuals. As expected, individuals who are on special diets and individuals who receive food stamps consume significantly less nutrients away from home than do their counterparts.

An increase in household size is generally associated with an increase in nutrient consumption from FAH but a decrease in nutrient consumption from FAFH. Moreover, age and income generally significantly affect individual consumption of many nutrients either from FAFH or FAH. In particular, consumption of almost all the nutrients from FAFH except for some energy-yielding nutrients decreases (increases) initially with successive increments of age (income) and then increases (decreases). The consumption pattern of most nutrients from FAH reverses with initial increases (decreases) followed by decreases (increases) with successive increments of age (income).

Introduction

Recent trends indicate that Americans are eating out more often and are becoming more interested in the nutritional content of the food eaten away from home. Heightened consumer interest in health and nutrition have increased the need for a complete understanding of either away-from-home or at-home nutrient consumption patterns. Moreover, differences in socioeconomic and demographic factors as well as the unequal distribution of economic and other resources have resulted in variations in nutrient consumption both away from home and at home by individuals. Concerns are also increasing about such nutrients as fats and cholesterol (Borra, 1988). However, the shift in emphasis of nutrition policy toward more concern about overconsumption of certain food constituents does not mean less concern about adequate intake of essential nutrients (Windham et al., 1983). The effect of these changing food consumption patterns on food distribution systems and on the nutritional status of the consumer must be examined.

A variety of activities and programs attempt to improve, regulate, and change consumption patterns of the population. Some of these programs/activities are direct intervention programs (food stamps, school lunch, school breakfast), food advertising, food labeling, nutrition education and research programs, nutrition surveys, and health care programs. Numerous studies have assessed the impacts of these various programs/activities on the dietary and nutritional status of either an individual or household (e.g., Capps and Schmitz [1991] for a literature review of these studies).

Food consumption relationships are traditionally specified between socioeconomic factors and quantity or expenditure measures. These approaches, however, do not allow inferences regarding the nutritional status of an individual's diet. Large quantities of food consumed or large expenditures on food either away from home or at home may not necessarily mean adequate nutrient consumption (Adrian and Daniel, 1976). To quote McCracken and Brandt (1987), "... knowledge is the key to rapid and efficient adjustments in the food system to changing consumer demands. Along with the impact of these changing food consumption patterns on the food distribution system itself, the nutritional intake of consumers is likely also to be affected." Knowledge of factors that affect nutrient demands can also be used in the design and implementation of nutrition programs.

Previous studies on nutrient consumption analysis provided baseline information for a number of critical purposes, including the assessment of dietary status and trends and the development of nutrition education policies and public nutrition programs. However, although considerable literature exists on demand models for nutrients, little attention is paid to the analysis of the demand for nutrients derived from either FAFH or FAH. Evaluation of the nutrients that are consumed from either FAFH or FAH would provide a means of assessing the nutritional quality of American diets. Such an evaluation would also allow a comprehensive description and understanding of nutrient consumption patterns not only from total food consumed but also from FAFH and FAH.

Our research attempts to fill these voids by using the Individual Intake phase of the 1987-88 National Food Consumption Survey (NFCS). Information on the nutrient intake of individuals in the away-from-home and at-home markets is available from this particular data set. Our research attempts to assess the impact of various socioeconomic characteristics of the individual not only on total nutrient consumption but also on nutrient consumption away from home and at home. Continual changes in the nature and complexity of the U.S. food supply also necessitate periodic monitoring of consumption levels of various nutrients either from all foods, FAFH, or FAH. This specification would allow not only the assessment and comparison of demand for nutrients derived from FAFH and nutrients derived from FAH but also a comparison of the results with previous studies. Knowledge of the various socioeconomic and demographic influences on the demands for the nutrients derived away from home can be used as an aid by the FAFH industry to develop marketing programs and strategies.

Literature Review

This section discusses some studies in the area of nutrient demand, focusing particularly on the different sociodemographic and economic characteristics. A summary of the selected studies of the demand for nutrients is also presented at the end of this section.

Cross-sectional data sets are used in the various selected studies. Some of the existing models are typically used to predict the nutrient intakes of individuals, given economic and sociodemographic characteristics. These studies are also used to assess dietary quality and the impacts of various government programs on the levels of nutrient intakes (e.g., Lane, 1978; Price et al., 1978; Davis and Neenan, 1979; Akin, Giulkey, and Popkin, 1983; Chavas and Keplinger, 1983; Scearce and Jensen, 1979; Devaney and Fraker, 1991; Basiotis et al., 1983). Common nutrients considered are iron, vitamin A, vitamin C, and calcium. The sociodemographic factors commonly included in the analyses are income, household size, ethnicity, and urbanization. The influence of these sociodemographic factors on nutrient levels varies across samples and model specifications. Evidence also exists, in most instances, to indicate that participation in government food assistance programs (e.g., Food Stamp Program; National School Lunch Program; National School Breakfast Program; Women, Infants, and Children Program) leads to increases in the levels of nutrient intakes, all other factors held constant. The objectives and general results of the studies mentioned above are subsequently described in more detail in the following text.

In 1976, Adrian and Daniel used the 1965-66 NFCS data set to estimate the impacts of socioeconomic characteristics of the households on the consumption of protein, carbohydrate, fat, vitamin A, calcium, iron, thiamin, and vitamin C. The socioeconomic factors considered were income, degree of urbanization, race, educational attainment of the homemaker, stage of the household in the family life cycle, family size, meal adjustment, and employment status of the homemaker. Regression analysis yielded indications that income positively affects the consumption of all the nutrients analyzed except carbohydrate. Nutrient consumption responsiveness to income, however, was small, which implies that future income increases have small impacts on food consumption, at least in the United States. The authors also found that urban and rural nonfarm households consume smaller quantities of all nutrients analyzed except vitamins A and C than do farm households. Black households also consume less carbohydrate, thiamin, and calcium than do either white or other race households. Families with more educated housewives tend to serve meals with less carbohydrate and fat and more vitamin C. However, households with employed housewives consume more carbohydrates and fats. The authors concluded that food and nutrition programs could be more effective if directed toward urban, less educated, and black households.

Lane (1978) examined the effects of the Food Distribution Program and Food Stamp Program on food consumption and nutrient demands in rural California. She used data from a survey of numerous households and considered food energy and eight nutrients (protein, calcium, vitamins A and C, iron, niacin, riboflavin, and thiamin) to be essential for adequate nutrition. Tobit analysis was used to determine the relationship between nutritional achievement ratios and the dollar value of food purchased and received per person for program participants and nonparticipants. Results indicate that additional values of food available affect nutritional adequacy for both participant and nonparticipant households of the Food Distribution Program. The value of food available was also associated with significantly higher ratios for calories and calcium under the Food Distribution Program and significantly higher ratios for calcium, vitamin A, and riboflavin under the Food Stamp Program. Generally, participants in the Food Distribution Program received more food than they would have purchased with food stamps and had slightly higher achievement ratios for nutrients like protein, iron, and thiamin than did nonparticipants.

Using a data set for Washington State schoolchildren, Price et al. (1978) developed a linear model of demand for 10 nutrients and determined whether either income and the National School Lunch Program, the National School Breakfast Program, or the Food Stamp Program affect demand. The nutrients analyzed are thiamin, riboflavin, niacin, protein, calcium, phosphorus, iron, vitamin A, vitamin C, and food energy. Their regression models using ordinary least squares reveal that full participants in the School Lunch Program have significantly higher intakes for 5 of 10 nutrients than non- or partial participants. On the other hand, food stamp recipients did not have significantly higher nutrient intakes than did other schoolchildren. The authors also found that food expenditures, income, and the Food Stamp Program did not affect demand as did household size and the National School Lunch Program.

Another study, which likewise considered the impact of Food Stamp and nutrition education programs on food group expenditure and nutrient intake of low-income households, was conducted by Davis and Neenan in 1979. The 1976 Expanded Food and Nutrition Education Program (EFNEP) records and a cross-sectional survey of low-income households in Florida data are used in the analyses. Using ordinary least squares, the authors provided estimates of the nutrient adequacy ratios (NAR) for five nutrients: protein, calcium, iron, vitamin A, and vitamin C. NAR is equivalent to the ratio of the dietary intake of nutrient and the RDA for nutrient. The sociodemographic variables used in these NAR equations are the following: income, household size, life cycle family composition, ethnicity, employment, urbanization, and education.

A similar study was conducted by Scearce and Jensen in 1979 to determine the effects of the Food Stamp Program on the amount of food energy and eight nutrients (protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, and vitamin C) purchased by low-income families in the southern United States. Scearce and Jensen used the 1972-73 Consumer Expenditure Survey of the Bureau of Labor Statistics (BLS) and a double logarithmic functional form; the results indicate that the food stamp participant families purchase a greater amount of food energy, protein, calcium, iron, vitamin A, and vitamin B_1 than do low-income families with similar socioeconomic characteristics that do not participate in the program. These results are consistent with the results reported by Lane (1978) for a California county.

Scearce and Jensen (1979) also found that nutrient demands are affected by income, household size, education, life cycle stage, and Food Stamp Program participation. Nutrient demands, however, are not affected by location or race. These results differ from the findings of Chavas and Keplinger (1983). Using the 1977-78 NFCS data set, Chavas and Keplinger examined the effects of nutrition programs on nutrient intake of persons from low-income households in the United States. Attention was given to the interaction between the effects of these programs and economic and sociodemographic variables. Among the important results were the following: (1) individual nutrient intake decreases significantly with size of household; (2) nutrient intake is responsive to income for average-income families but not for low-income families; (3) nutrient intake is positively related to the education of the household head; and (4) domestic programs like the WIC program, meal service for the elderly, Food Stamp Program, and the National School Breakfast Program exhibit significantly positive influences on intake of nutrients. The School Lunch Program is the least effective of the nutrition programs analyzed.

Akin et al. (1983) used the 1977-78 NFCS data set to examine the effect of the National School Lunch Program participation on the intake status of participants for four nutrients (vitamin B_6, iron, vitamin A, and vitamin C) and food energy. Using switching regression analysis, the authors found strong evidence of a positive impact of the National School Lunch Program on nutrient consumption by both low-income and high-income children. This impact is, however, greater for low-income children than high-income children. Age, economic need, and ethnicity but not location had significant effects on nutrient consumption.

Windham et al. (1983) explored the relationships between some demographic and socioeconomic characteristics of individuals and the nutrient density of their diets. Using the 1977-78 NFCS data set, regression analysis was employed to test the effects of various socioeconomic and demographic factors on the nutrient density consumption of food energy and 14 nutrients. The nutrients analyzed are protein, fat, carbohydrate, calcium, iron, magnesium, phosphorus, vitamin A, thiamin, riboflavin, niacin, vitamin B_6, vitamin B_{12}, and vitamin C. Results from the multiple regression analysis indicate that income had no statistically significant effect upon the nutritional quality of diets. However, results of this study also indicate that several socioeconomic characteristics of individuals (e.g., household size, race, geographic region) were related to the dietary density of certain nutrients. Employment status of the male and female head of the household was not significantly related to individual nutrient density consumption of 12 or 13 nutrients analyzed. Furthermore, the socioeconomic factors included in the models had no significant effects on the consumption of protein, iron, phosphorus, riboflavin, and vitamin B_{12} per 1,000 kilocalories. Nutrient density consumption patterns of different socioeconomic groups appeared to be generally uniform.

Using data from the special low-income component of the 1977-78 NFCS data set, Basiotis et al. (1983) investigated nutrient consumption patterns of low-income households. In particular, the authors examined the relationships between household nutrient availability, food costs, food stamp participation, and selected socioeconomic factors in a simultaneous equations context. The nine-equation model consists of an equation for food cost and eight equations for nutrient availability levels. Aside from food energy, the nutrients examined are protein, calcium, iron, riboflavin, thiamin, vitamin C, and vitamin A. The results indicate that food stamp participation has a positive impact on diet component availability levels. However, the impacts of other socioeconomic variables examined for diet component availability are larger than those for program participation and income.

Devaney and Fraker (1989) examined the dietary impacts of the School Breakfast Program based on 24-hour dietary recall data collected during the 1980-81 school year. Probit analysis was used to estimate a model in which the likelihood of eating breakfast is a nonlinear function of the National School Breakfast Program availability and socioeconomic characteristics. Results indicate that the availability of the School Breakfast Program has no effect on the decision to eat breakfast. The authors concluded that the School Breakfast Program is not achieving its basic objective of providing breakfast to children who would not otherwise eat one. Education, employment status of the female head of household, sex, race, age, and ethnicity are significant socioeconomic factors affecting the likelihood of eating any breakfast. They also analyzed the effect of the School Breakfast Program on the intake of food energy, cholesterol, vitamin B_6, vitamin A, iron, calcium, and magnesium using Heckman's procedure for correcting for selection bias. General findings indicate that participation in the program is associated with higher intakes of calcium but lower intakes of cholesterol and iron at breakfast.

Later, in 1991, Devaney and Moffitt used data from the 1979-1980 Survey of Food Consumption in Low-Income Households to assess the dietary effects of the Food Stamp Program. Using ordinary least squares, the authors revealed that the estimated dietary effects of changes in Food Stamp Program benefits are considerably larger than those resulting from changes in cash income. The estimates of the ratios of the marginal propensity to consume for the food stamp benefit and for the cash-income variable range from 3 to 7 across nutrients. These estimates of marginal propensity to consume are comparable in magnitude to those from the Basiotis et al. (1983) study. However, the estimates of the total effects of the Food Stamp Program from the Devaney and Moffitt (1991) study generally are larger than the comparable estimates from the Basiotis et al. (1983) study.

Some of the studies that have used the 1977-78 NFCS data set are descriptive in nature. One of these studies was conducted by Windham et al. in 1983. The objective of this study was to evaluate, relative to a standard, the quality of diets consumed by various socioeconomic groups known to have diets with different nutrient content per energy unit of food consumed. The composite data for this study indicated that the average American diet based on the 1977-78 NFCS data met or exceeded nutrient density standards for protein, phosphorus, thiamin, vitamin A, riboflavin, niacin, vitamins B_{12} and C, and fat per 1,000 kilocalories of food consumed. However, these diets provided only about 80 to 90 percent of nutrient density allowances for calcium, iron, magnesium, vitamin B_6, and carbohydrate.

Pao et al. (1985), on the other hand, made comparisons of the 1-day and 3-day nutrient intakes of various individuals in 22 sex-age groups using the 1977-78 NFCS data set. Results indicate that mean energy and nutrient intakes studied from 3-day and 1-day diets yielded similar information on nearly all age groups, regardless of sex. Therefore, 1-day intakes provided nearly the same reliability of results as the 3-day intakes did in the computation of mean intakes of large groups.

A summary of selected studies pertaining to the demand for specific nutrients is presented in Table 1. Capps and Schmitz (1991, p. 22) mentioned that "knowledge of factors which influence nutrition demands is useful in the design and implementation of programs to promote improvements in nutrition as well as to make current programs more effective and efficient." As in the FAFH expenditure and consumption studies, cross-sectional data are used in these selected nutrient demand studies. Common nutrients considered are food energy, iron, vitamin A, vitamin C, and calcium. The sociodemographic factors commonly included in the analyses are income, household size, ethnicity, and urbanization.

Some of the existing models are typically used to predict the nutrient intakes of individuals. As well, these studies are used to assess dietary quality and the impacts of various government programs on the levels of nutrient intakes. These selected studies, however, have focused their analyses on nutrients derived from total food consumption and have not made comparisons between the nutrients derived from FAH and FAFH consumption. Evaluation of the nutrients that are consumed from either all foods, FAFH, or FAH would provide a means of assessing the nutritional quality of American diets as well as a comprehensive understanding of nutrient consumption patterns not only from total food consumed but also from FAFH and FAH.

Theory and Methods

This section presents the theoretical considerations and framework used in developing the nutrient demand models. The basic model of demand for specific nutrients resembles the Engel function, which relates changes in the consumption of a good to changes in income. This function can be derived from consumer theory by assuming that a consumer chooses his consumption bundle to maximize his

Table 1. Selected studies pertaining to the demand for specific nutrients.

Researcher	Data set[a]	Nutrients considered[b]	Food assistance programs considered[c]	Sociodemographic factors considered
Price, West, Schier, Price	Washington State children	10: Th, Rb, Ni, FE, Pr, Ca, Ph, Iron, VA, VC	FSP, NSBP, NSLP	Household size, region, urbanization, ethnicity
Akin, Guilkey, Popkin	1977-78 NFCS (basic sample) school-age children	5: FE, VB_6, Iron, VA, VC	NSLP	Urbanization, income, household size, race, ethnicity
Chavas, Keplinger	1977-78 NFCS (spring portion)	12: FE, Pr, Ca, Th, Iron, Rb, VB_6, VB_{12}, VC, Ph, VA, Ni	FSP, NSLP, NSBP, WIC, Meal service for the elderly	Income, ethnicity, education, household size, race
Scearce, Jensen	1972-73 BLS, CES	9: FE, Pr, Ca, Iron, VA, VB_1, VB_2, Ni, VC	FSP	Education, urbanization, income, life cycle stage, race, household size
Devaney, Fraker	1980-81 cross-sectional survey of students, 1980-81 household survey of parents	7: FE, Chol, VB_6, VA, Iron, Ca, Mg	NSBP	Race, ethnicity, education, employment status, region, household size, urbanization
Adrian, Daniel	1965-66 NFCS	8: Pr, Carb, Fat, VA, Ca, Iron, Th, VC		Income, family size, urbanization, life cycle stage, race, education, employment
Lane	1972 survey of households in Kern County, CA (low income)	9: FE, Pr, Ca, VA, VC, Iron, Ni, Rb, Th	FDP, FSP	
Davis, Neenan	1976 EFNEP and cross-sectional survey of households in central Florida	5: Pr, Ca, Iron, VA, VC	FSP, EFNEP	Income, household size, life cycle stage, family composition, ethnicity, employment, urbanization, education
Windham, Wyse, Hansen, Hurst	1977-78 NFCS	15: Pr, FE, Fat, Carb, Ca, Iron, Mg, Ph, VA, Th, Rb, Ni, VB_6, VB_{12}, VC		Region, urbanization, income, household size, race, employment, education
Devaney, Moffitt	1979-80 Survey of Food Consumption in Low-Income Households (SFC-LI)	11: FE, Pr, VA, VC, Th, Rb, VB_6, Ca, Ph, Mg, Iron	FSP	Income, race, household size, region, ethnicity, urbanization, age
Basiotis, Brown, Johnson, Morgan	1977-78 NFCS (low income)	8: Iron, Pr, Ca, FE, Rb, Th, VC, VA	FSP	Household size & composition, urbanization, race, income, region

[a]NFCS = National Food Consumption Survey. BLS, CES = Bureau of Labor Statistics, Consumer Expenditure Survey. EFNEP = Expanded Food and Nutrition Education Program.

[b]FE — food energy, Pr — protein, VA — vitamin A, VB_1 — vitamin B_1
Th — thiamin, Ca — calcium, VC — vitamin C, VB_2 — vitamin B_2
Rb — riboflavin, Ph — phosphorus, VB_6 — vitamin B_6, Chol — cholesterol
Ni — niacin, Iron — iron, VB_{12} — vitamin B_{12}, Mg — magnesium
Fat — total fats, Carb — carbohydrate

[c]FSP — Food Stamp Program
FDP — Food Distribution Program
EFNEP — Expanded Food and Nutrition Education Program
NSBP — National School Breakfast Program
NSLP — National School Lunch Program
WIC — Women, Infants, and Children Program

Note: A portion of this table was taken from Capps and Schmitz (1991, p. 23).

utility subject to a budget constraint. Maximizing a consumer's utility subject to the budget constraint will lead to demand functions for commodities :

$q_i = f_i(p, y)$ (1)

where p denotes a vector of prices; y is consumer income; and q_i is the consumption of the ith commodity. By extending this model to examine the demand for nutrients, the intake of nutrient k is (Devaney and Fraker, 1989):

$N_k = \Sigma_j a_{kj} q_j \quad k = 1,...,K$ (2)

where a_{kj} denotes the amount of nutrient k (k = 1,2,...,K) contained in each unit of commodity q_j. Substituting equation (1) into equation (2) leads to demand functions for nutrients of the following form:

$N_k = g_k(p,y).$ (3)

Recognizing that consumers' preferences may vary with various sociodemographic and anthropomorphic variables and assuming that prices are constant in a cross-sectional data set, a demand model for specific nutrients can be specified as:

$N_{ki} = h_{ki}(y_i, S)$ (4)

where N_{ki} corresponds to the intake of nutrient k by individual i; y_i corresponds to the income level of the individual i; and S is a vector representing the various sociodemographic, anthropomorphic, and food programs participation factors.

Twenty-eight nutrients are selected for the analysis. These nutrients, along with their units of measurement, are exhibited in Table 2. From previous studies (see Table 1 for a summary) and conditioned on the data available in the 1987-88 NFCS, the independent variables used in the analyses include urbanization, region, race, sex, employment, household size, age, height, weight, and income. Dummy variables pertaining to whether the individual receives food stamps or not, whether the individual is on a special diet or not, and whether the intake of nutrients occurred mostly during a weekend or a weekday are also included in the analyses. The general model specification used is therefore:

$N_{ki} = b_0 + b_1$urban1 + $b_2$urban2 + $b_3$region1 + $b_4$region2 + $b_5$region4 + $b_6$race2 + $b_7$race3 + $b_8$race4 + $b_9$hisp1 + b_{10}sex1 + b_{11}employ1 + b_{12}fstamp1 + b_{13}diet1 + b_{14}hsize + b_{15}weight + b_{16}height + b_{17}age + b_{18}agesq + b_{19}weekend + b_{20}income + b_{21}incomesq

where :

N_{ki} = average daily intake of nutrient k by individual i. The units of measurement are displayed in Table 2.

urban1 = 1 if individual resides in a central city; 0 otherwise

urban2 = 1 if individual resides in a suburban area; 0 otherwise

region1 = 1 if individual is in the Northeast; 0 otherwise

region2 = 1 if individual is in the Midwest; 0 otherwise

region4 = 1 if individual is in the West; 0 otherwise

race2 = 1 if individual is black; 0 otherwise

race3 = 1 if individual is Asian or Pacific Islander; 0 otherwise

race4 = 1 if individual is of some other race; 0 otherwise

hisp1 = 1 if individual is Hispanic; 0 otherwise

sex1 = 1 if individual is male; 0 otherwise

employ1 = 1 if individual is employed; 0 otherwise

fstamp1 = 1 if individual is receiving food stamps; 0 otherwise

diet1 = 1 if individual is on a special diet; 0 otherwise

hsize = household size

weight = weight of the individual in pounds

height = height of the individual in inches

age = age of the individual in years

agesq = square of the age of the individual

weekend = 1 if the 3-day intake of the individual occurred mostly during a weekend; 0 otherwise

income = household income

incomesq = square of household income

One classification is eliminated from each group of variables for estimation purposes. The base group is individuals who satisfy the following description: reside in a nonmetro area (urban3); in the South

Table 2. Nutrients used in the analyses and their units of measurement.

Nutrient	Unit of measurement
1. Food energy	kilocalories
2. Protein	grams per 1000 kilocalories
3. Total fat	grams per 1000 kilocalories
4. Saturated fatty acids	grams per 1000 kilocalories
5. Monounsaturated fatty acids	grams per 1000 kilocalories
6. Polyunsaturated fatty acids	grams per 1000 kilocalories
7. Cholesterol	milligrams
8. Carbohydrate	grams per 1000 kilocalories
9. Total dietary fiber	grams per 1000 kilocalories
10. Alcohol	grams per 1000 kilocalories
11. Vitamin A	international units
12. Carotene	micrograms retinol equivalents (RE)
13. Vitamin E	milligrams alpha-tocopherol equivalents (a-TE)
14. Vitamin C	milligrams
15. Thiamin	milligrams
16. Riboflavin	milligrams
17. Niacin	milligrams
18. Vitamin B_6	milligrams
19. Folate	micrograms
20. Vitamin B_{12}	micrograms
21. Calcium	milligrams
22. Phosphorus	milligrams
23. Magnesium	milligrams
24. Iron	milligrams
25. Zinc	milligrams
26. Copper	milligrams
27. Sodium	milligrams
28. Potassium	milligrams

(region3); white (race1); nonhispanic (hisp2); female (sex2); not employed (employ2); not participating in the food stamp program (fstamp2); not on a special diet (diet2); and the 3-day intake occurred mostly during a weekday (weekday). Household income is used instead of individual income because the NFCS data set provides income information for the household only and not for an individual.

The analyses are separated into three different food sources, FAFH, FAH, and all foods eaten, to determine nutrient consumption pattern differences and the factors that affect nutrient consumption across these three food sources. Since excess consumption of 1 nutrient does not compensate for deficiencies in another, 28 separate nutrient consumption models are specified for each of the 3 food sources to explain nutrient intake. The same set of independent variables is also used for each nutrient consumption model because nutrients are constituent parts of food and therefore may affect the consumption of each nutrient analyzed. Each nutrient may be affected differently by the various independent variables included, but there are no a priori reasons to include or exclude any of these factors in any of the nutrient equations. Dietary fiber and the energy-yielding nutrients, protein, total fat, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, carbohydrate, and alcohol are all expressed as nutrient densities or in grams per 1,000 kilocalories to allow proper comparison between individuals. The anthropomorphic measurements of the individual — age, sex, height, and weight — are included as independent variables to account for physical differences between individuals. For instance, male individuals might eat more than female individuals, and taller and heavier individuals might eat more than shorter and lighter individuals. Thus, squared terms are included for income and age to investigate possible nonlinearities in the Engel relationships for FAFH, FAH, and all-food consumption.

Hypotheses formulated for the nutrient demand part of the analysis are presented in Table 3. Some of these hypotheses are conceived from the results of previous studies. It is hypothesized that individuals who reside in a central city or suburban area demand lesser amounts of most nutrients derived from either all foods or FAH than is demanded by individuals residing in a nonurban area because individuals residing in nonurban areas expend more body energy than do individuals in the urban or suburban areas (Adrian and Daniel, 1976). Urbanization is also related to several variables like accessibility to diverse types of stores providing a wide variety of foods; differences in the social, cultural, and economic environment such as occupational opportunities and education; and the amount of information available to the individual (Scearce and Jensen, 1979). Because of the presence in urban areas of numerous restaurants and fast-food facilities, individuals residing in central cities or suburban areas are expected to consume more nutrients from FAFH than do individuals from nonmetro areas.

Previous research studies indicate that Southerners generally eat more FAFH than do individuals in other regions and therefore might have more intake of nutrients. Race of the individual can affect the purchasing habits and hence the amount of nutrients available to an individual. However, race is complicated by its relationship with other socioeconomic and demographic characteristics. No a priori hypoth-

Table 3. Hypothesized signs of the parameter estimates of most of the nutrient demand equations.

Independent variables	All food	FAFH[a]	FAH[b]
Urbanization (base = nonmetro)			
Central city	-	+	-
Suburban area	-	+	-
Region (base = South)			
Northeast	+/-	-	+/-
Midwest	+/-	-	+/-
West	+/-	-	+/-
Race (base = white)			
Black	+/-	+/-	+/-
Asian/Pacific Islanders	+/-	+/-	+/-
Other	+/-	+/-	+/-
Ethnicity (base = nonhispanic)			
Hispanic	+/-	+/-	+/-
Sex (base = female)			
Male	+	+	+
Employment (base = unemployed)			
Employed	+/-	+	-
Food stamp participation (base = nonrecipient)			
Recipient	-	-	-
Special diet (base = not)			
On special diet	-	-	-
Household size	+/-	-	+
Weight	+	+	+
Height	+	+	+
Weekend	+/-	+	+/-
Age	+/-	+/-	+/-
Age squared	+/-	+/-	+/-
Income	+/-	+	+/-
Income squared	+/-	-	+/-

[a]FAFH = food away from home.
[b]FAH = food at home.
Note: The +/- notation denotes no a priori expectations.

esis is then specified about the impact of race on the amount of nutrient intake of an individual either from FAFH, FAH, or all foods eaten. Being male is expected to have a greater impact on nutrient intake than being female. Compared with unemployed individuals, employed individuals are hypothesized to consume more nutrients derived from FAFH and all foods but not from FAH. Because food stamp recipients are generally less affluent than food stamp nonrecipients, recipients are expected to consume less amounts of various nutrients than do nonrecipients. Generally, individuals on special diets are expected to consume less amounts of various nutrients than are those not on a special diets.

As household size increases, it is hypothesized that the individual would increase the intake of most nutrients derived from FAH but not from FAFH. The weight and height of an individual are also expected to be positively related to the amount of intake of most nutrients. Individuals who consumed food mostly during a weekend are expected to have greater amounts of intake of most nutrients derived from FAFH than are individuals who consumed food mostly during a weekday. Increases in income are expected to be associated with increases in intake of most of the nutrients from FAFH, but at a decreasing rate. Educational status of the individual is not included in the analyses because the data set provides information only on the educational status of the male and female heads of the households.

Because of the nature of the data used (cross-sectional data) in this study, certain parts of the sample have zero FAFH consumption. Depending on the proportion of zero observations on a dependent variable, either ordinary least squares (OLS) or the Heckman Sample Selection Procedure is used in the analysis. However, when the proportion of zero observations on a dependent variable is high, using OLS to estimate the models would result in biased and inconsistent estimates. On the other hand, omitting the zero observations in the OLS runs will result in the estimates characterized by sample selection bias. Heckman (1976, 1979) described sample selection bias as a type of a specification error or omitted-variable problem. Subsequently, Heckman proposed a technique that amounts to estimating the omitted variable using probit analysis and then employing either OLS or generalized least squares to the model with the inclusion of the estimated omitted variable. This technique is appropriate when a notable proportion of the observations on a dependent variable is equal to zero.

The description of the Heckman Sample Selection Procedure is summarized in Table 4. A two-equation model is specified in equations (1) and (2). The assumptions about the disturbance terms, which are consistent with random sampling, are specified in equations (3) and (4). Suppose that there are N_0 observations for which $y_{1i} = 0$, and N_1 (equal to $N-N_0$) observations for which $y_{1i} > 0$. Assuming without any loss of generality that the N_1 observations for y_{1i} occur first and the sample selection rule that determines the availability of data is as follows: data are available on y_{1i} if $y_{2i} > 0$ and there are no observations on y_{1i} if $y_{2i} \leq 0$. Then the conditional means of the disturbance terms of (1) and (2) are presented in (5) and (6) of Table 4, respectively. If equation (1) is estimated using the censored or incomplete sample in which only observed data on y_{1i} are included, the omitted variable is $(\sigma_{12}/(\sigma_{22})^{1/2})\lambda_i$. Consequently, to make the model complete, the specification must be the same as equation (8) in which λ_i is inserted as the additional variable to correct for sample selection bias.

Table 4. Description of the Heckman Sample Selection Procedure.

(1) $y_{1i} = x_{1i}\beta_{1i} + e_{1i}$

(2) $y_{2i} = x_{2i}\beta_{2i} + e_{2i}$ $\quad i = 1, ..., N$

where

(3) $E(e_{ji}) = 0$ $\quad$ for j = 1, 2

(4) $E(e_{ji}e_{j'i'}) = \sigma_{jj}$ $\quad$ for i = i', j,j' = 1, 2

$= 0$ $\quad$ for $i \neq i'$

(5) $E(e_{1i}|y_{2i} > 0) = E(e_{1i}|e_{2i} > -x_{2i}\beta_2)$

$= (\sigma_{12}/(\sigma_{22})^{1/2})\lambda_i$

(6) $E(e_{2i}|y_{2i} > 0) = E(e_{2i}|e_{2i} > -x_{2i}\beta_2)$

$= (\sigma_{22}/(\sigma_{22})^{1/2})\lambda_i$

where

(7) $\lambda_i = f(z_i)/F(z_i)$

$z_i = x_{2i}\beta_2/(\sigma_{22})^{1/2}$

f and F respectively are the density and distribution function of the standard normal distribution.

(8) $y_{1i} = x_{1i}\beta_1 + ((\sigma_{12})/((\sigma_{22})^{1/2}))\lambda_i + v_{1i}$

where $E(v_{1i}) = 0$

(9) $E(v^2_{1i}) = \sigma_{11}(1+\rho^2(-z_i\lambda_i-\lambda_i^2))$

where $\rho = \sigma_{12}/(\sigma_{11}\sigma_{22})^{1/2}$

Source: Heckman, J.J. "The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variables and a Simple Estimator for Such Models," *Annals of Economic and Social Measurement*, 5(1976):475-492.

The index z_i in equation (7) is obtained from (2) using probit analysis. Equation (2) in this case is specified as a qualitative choice model in which a new dependent variable D_i is defined such that it takes the value of 1 when $y_{2i} > 0$ but takes a value of 0 otherwise. By using probit analysis, the probability that y_{2i} is positive is determined by the method of maximum likelihood. Consequently, λ_i can now be computed for each observation of the complete sample using (7) of Table 4 since z_i, $f(z_i)$, and $F(z_i)$ can already be estimated. The variable λ is called the inverse of Mill's ratio and is defined as the ratio of the value of the standard normal density function to the value of the standard normal distribution function.

The second step involves the estimation of (8); the estimate of λ_i is inserted as a regressor, using either OLS or generalized least squares. Equation (9) of Table 4 implies that the error structure of (8) is heteroskedastic. A generalized least squares procedure may, therefore, improve the precision of the least square estimates of the complete model (8). The weight that is used for each observation for the generalized least squares procedure is $(1+\rho^2(-z_i\lambda_i-\lambda_i^2))^{1/2}$. The value of ρ^2 is obtained by regressing each squared residual (v_{1i}^2) from the OLS estimation of (8) on $-z_i\lambda_i-\lambda_i^2$. Then according to (9), the estimated intercept of this regression represents the estimated σ_{11}, while the estimated slope constitutes the estimate of $\rho^2\sigma_{11}$. This procedure, developed to correct for heteroskedasticity, however, may break down if the estimated σ_{11} is negative or the estimate of ρ^2 does not lie in the unit interval.

Finally, if the estimated coefficient associated with λ described above is significantly different from zero, then sample selection bias is said to exist. Otherwise, no sample selection bias arises from using nonrandomly selected samples to estimate behavioral relationships (Heckman, 1976).

For the nutrient demand equations without a high proportion of zero observations in the dependent variable, heteroskedasticity in the disturbances is checked using the Breusch-Pagan-Godfrey (BPG) test. The BPG test involves an auxiliary regression in which each squared residual from the OLS estimation is regressed on the same set of regressors used in the original equation. An F-test is then performed on all the coefficients except the intercept. The null hypothesis of no heteroskedasticity is rejected if the F-test is statistically significant at a specified significance level (0.05 level) in this study. If heteroskedastic disturbances are indeed found in these equations, weighted least squares is employed, the weights being the reciprocal of the square root of the fitted values from the auxiliary regression involving the squared residuals.

Data Source and Description

The data set used in this study is the Individual Intake phase of the United States Department of Agriculture's (USDA) 1987-88 Nationwide Food Consumption Survey (NFCS). This data set is the most recent of the national household food consumption surveys conducted by USDA. The first USDA food consumption survey was in 1894. Over the years, USDA surveyed food consumption in 1936-37, 1942, 1948, 1955, 1965-66, 1977-78, 1985, 1986, and 1987-88. Data collection for 1987-88 NFCS data set started on April 1987 and continued through August 1988. The 1987-88 survey contains two parts: (1) household food use and (2) individual intake. The household phase provides information on food used by the household for a 1-week period and on the cost of that food. The Individual Intake phase, on the other hand, provides 3 days of information on food intake of household members. The Individual Intake phase of the 1987-88 NFCS data set marks only the fifth time that nationwide information on the dietary intakes of individual household members has been collected by USDA.

The 1987-88 NFCS sample was designed using a multistage, stratified area probability sampling method. According to the USDA, the stratification plan took into account geographic location, degree of urbanization, and socioeconomic considerations. This stratification process resulted in 60 strata (17 central city, 28 suburban, and 15 nonmetro areas), which correspond to the geographic distribution, urbanization, and the density of the population within the conterminous United States. The selection of households for the sample in a particular area was based on a prelisted number of housing units in the area as well as on the estimates of occupancy rates. More details about the data collection process can be obtained from the USDA.

The Individual Intake phase of the 1987-88 NFCS data set provides data on 3 days of food and nutrient intake by individuals of all ages surveyed in the 48 contiguous states. These individuals were asked to provide 3 consecutive days of dietary data. The first day's data were collected using 24-hour dietary recall. The period for this 1-day recall was from midnight to 11:59 p.m. on the day preceding the interview (USDA). This collection was done using an in-home personal interview. The second and third days' data were collected using a self-administered 2-day dietary record.

Respondents were asked about the sources of each food eaten. Sources included food that was eaten at home, food brought into the home but later eaten away from home, and food that was never brought into the home. USDA considers food from the first two sources to be from the home food supply. Thus, this study considers food from the first two sources to be food at home (FAH) and the third source to be food away from home (FAFH). To get the nutrient intake for the day, USDA summed up the amounts of each nutrient in each food reported by an individual. The amount of each nutrient in each food eaten was calculated using the weight (in grams) of that food and the nutritive value of that food (per 100 grams) from a nutrient data base developed by Human Nutrition Information Service (HNIS). This nutrient data base contains values for food energy as well as 29 nutrients. Aside from food energy, information is available concerning the following nutrients: (1) water, (2) protein, (3) total fat, (4) saturated fatty acids, (5) monounsaturated fatty acids, (6) polyunsaturated fatty acids, (7) cholesterol, (8) carbohydrate, (9) total dietary fiber, (10) alcohol, (11) vitamin A in international units, (12) vitamin A in micrograms retinol equivalents, (13) carotenes, (14) vitamin E, (15) vitamin C, (16) thiamin, (17) riboflavin, (18) niacin, (19) vitamin B_6, (20) folate, (21) vitamin B_{12}, (22) calcium, (23) phosphorus, (24) magnesium, (25) iron, (26) zinc, (27) copper, (28) sodium, and (29) potassium.

With the exception of water and vitamin A in micrograms of retinol equivalents, all these nutrients and food energy are used in the empirical analyses part of this study. Protein, total fat, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, carbohydrate, and alcohol are expressed as nutrients per 1,000 kilocalories or as nutrient densities because these nutrients are sources of energy. The expression of these eight nutrients as nutrient densities accounts for differences in the amount of nutrients taken relative to a set number of calories and therefore allows direct nutrient intake comparison of individuals per 1,000 kilocalories.

The individual intake data set also includes information of the individual on the following variables: urbanization, region, race, sex, employment status, food stamp participation, WIC participation, National School Lunch and National School Breakfast Programs participation, special diet information, household size, age, household income, food sources, and foods consumed.

The response rate by households in the survey was low. In particular, participation by households drawn into the sample was below 35 percent. This rate is lower than in previous NFCS data sets. USDA indicated that a major reason for this occurrence was "heavy respondent burden" in terms of the amount of information asked from each respondent. Survey results may then be biased if respondents and nonrespondents have systematically different behavior. In terms of the population characteristics in the March 1987 Current Population Survey, the unweighted sample represented the population fairly well. Nevertheless, Bethlehem (1988) has shown how reweighting can reduce the potential for nonresponse bias. Consequently, even if the sample was designed to be self weighting, HNIS and statisticians at Iowa State University created weights for the individuals in the sample to match the characteristics of the sample and the population. Weights were constructed separately for each of three sex/age groups and for 1-day intakes and 3-day intakes. The three groups that HNIS used were men age 20 and over, women age 20 and over, and persons less than 20 years of age. More information on the weighting procedure is available from HNIS.

The number of days in which food intake information was available for an individual varied. Thus, for some individuals the information was provided for only a 2-day or 1-day period. The intra-individual effects of variations of the different interview processes employed in each of the 3 days of intake could be overridden by combining all the individuals with 1 day, 2 days, and 3 days of completed intake. The 1-day dietary recall, for instance, has been criticized because it depends upon memory and may not capture information representing an individual's usual intake. The record method, on the other hand, has been recommended because food consumption can be recorded immediately after ingestion. Respondent burden is, however, increased and intake information may be biased (Pao et al., 1985). Moreover, more than 80 percent of the sample completed 3 days of intake. For these reasons, only individuals who have completed 3-day intakes are included in the analysis. Data are weighted to maintain representativeness of the sample by adjusting for nonresponse. The weights for the 3-day intake are used for this purpose.

As in any cross-sectional study, several issues arise in handling the data set. The first data issue is about missing nutrient information on some of the individuals. The dependent variable that is employe in the nutrient demand part of the study is average daily nutrient intake. Individuals without 3 days of completed intake information and individuals with missing nutrient intake information are then deleted from the sample. The second issue is missing information on the socioeconomic and demographic variables. This situation constitutes a missing-value problem.

The process of obtaining the final samples of observations for the analyses is handled sequentially (Fig. 1). First, the original data, which contains 11,045 individuals, are edited with respect to individuals without 3 days of completed intake. After deleting information from individuals without 3 days of completed intake, the data set contained 8,468 observations. Second, the original data are edited with respect to missing socioeconomic and demographic information as well as missing nutrient intake information. Three different data sets are then created corresponding to each food source: FAFH, FAH, and all foods eaten. After eliminating data from individuals having some missing relevant nutrient intake, socioeconomic, and demographic information, the all-foods data set has 6,219 observations. The FAFH and FAH data sets, on the other hand, have 4,225 and 6,186 observations, respectively.

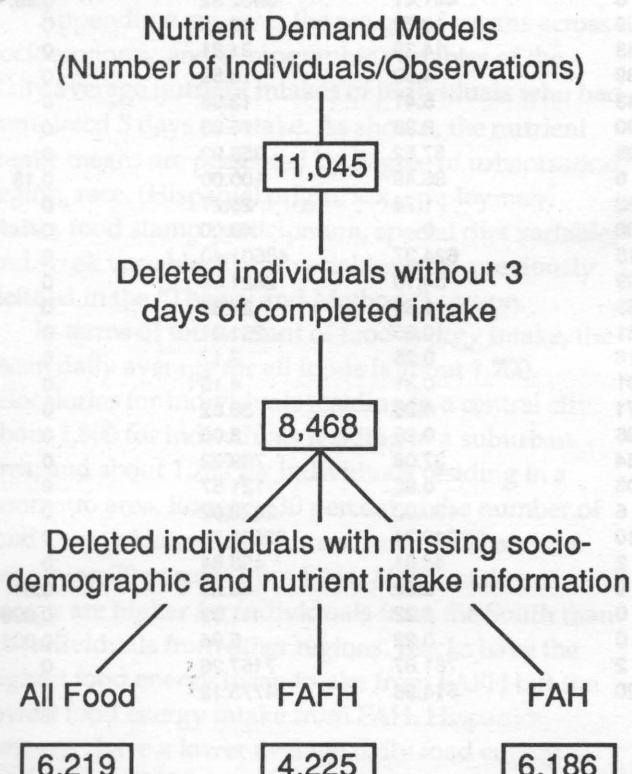

Figure 1. Schematic diagram of the data-screening process.

Table 5 presents the descriptive statistics of the 28 nutrients. A listing of the nutrients with their units of measurement is provided in Table 2. On the average, more food energy in terms of kilocalories per day seems to be coming from FAH than from FAFH. In fact, the average amount of food energy an individual gets from FAH per day is about twice the average amount of food energy an individual gets from FAFH per day. No significant differences between FAFH and FAH seem to be evident on the average amounts taken of nutrients that are sources of energy (those expressed as nutrient densities), except for dietary fiber. An individual takes an average of about 3 grams per 1,000 kilocalories of dietary fiber per day from FAH compared with slightly less than 2 grams per 1,000 kilocalories of dietary fiber per day from FAFH. Interestingly, more daily alcohol consumption, on the average, is coming from FAFH consumption than from FAH consumption. In terms of the other nutrients, roughly 20 to 40 percent of total nutrient consumption comes from FAFH per day.

Table 6 shows the means of the exogenous variables used in the regression analyses. Considering the sample used for all foods, about 21 percent of the sample reside in central city areas (urban1); 49 percent in suburban areas (urban2); and 30 percent in nonmetro areas (urban3). Most of the individuals (35 percent) included in the sample for all foods come from the South (region3). Eighty-six percent are white (race1); 96 percent are nonhispanic (hisp2); 45 percent are male (sex1); 58 percent are employed (employ1); 95 percent are nonrecipients of the National Food Stamp Program (fstamp2); 14 percent are on a special diet (diet1); and about 16 percent ate food mostly on a weekend during the 3-day survey period (weekend). Moreover, the average age of the individuals is about 43 years for the all food and FAH samples and roughly 40 years for the FAFH sample. Average household size is approximately three for the three samples. Average weight is about 159 or 160 pounds and average height is about 66 or 67 inches. Average household income is higher in the FAFH sample than in the all-food and FAH samples.

Empirical Results

The objective of this research is to determine the factors that affect the demand for various nutrients from all foods, FAFH, and FAH. For this reason, the consumption of 28 nutrients from all foods, FAFH, and FAH are analyzed. This section presents the descriptive results as well as the regression results.

Table 5. Descriptive statistics of the nutrients.

	Mean	S.D.	Z[a]	Median	Max.	Min.
I. All foods (N = 6219)						
Food energy	1760.53	3694.71	0	1632.21	7131.87	99.94
Protein[b]	13.94	16.91	0	13.78	35.53	3.15
Total fat[b]	13.65	13.38	0	13.78	22.24	1.52
Saturated fat[b]	4.87	6.40	0	4.84	11.28	0.43
Monounsat fat[b]	5.09	5.61	0	5.13	11.96	0.16
Polyunsat fat[b]	2.59	4.84	0	2.51	8.35	0.12
Cholesterol	288.89	896.34	3	248.13	1628.07	0
Carbohydrate[b]	38.40	38.41	0	38.06	83.36	10.61
Dietary fiber[b]	2.44	5.50	1	2.28	13.23	0
Alcohol[b]	0.68	10.86	5053	0	22.81	0
Vitamin A(IU)	6018.99	31342.40	0	4054.52	93977.60	14.09
Carotenes	415.49	2713.51	1	231.90	9328.78	0
Vitamin E	7.82	28.69	0	6.73	71.40	0.14
Vitamin C	89.46	363.52	0	71.49	786.58	0.07
Thiamin	1.32	3.28	0	1.23	8.10	0.06
Riboflavin	1.68	4.39	0	1.53	12.48	0.05
Niacin	19.11	43.34	0	17.71	92.04	0.14
Vitamin B_6	1.50	3.98	0	1.36	10.50	0.07
Folate	222.17	688.82	0	195.07	1914.36	8.13
Vitamin B_{12}	5.47	45.97	3	3.80	168.34	0
Calcium	703.97	2160.13	0	617.61	3966.81	20.00
Phosphorus	1112.23	2499.90	0	1032.82	4192.67	37.57
Magnesium	233.99	524.38	0	219.53	833.82	20.83
Iron	12.35	33.18	0	11.07	82.92	0.08
Zinc	10.23	32.80	0	9.19	266.06	0.42
Copper	1.05	2.89	0	0.96	14.22	0.02
Sodium	2974.08	7095.98	0	2756.20	12744.30	79.71
Potassium	2393.84	5133.30	0	2274.85	8855.40	197.68
II. Food away from home (N = 4225)						
Food energy	597.80	2693.85	0	441.41	3962.32	0.80
Protein[b]	12.94	30.50	59	12.73	48.45	0
Total fat[b]	13.87	24.22	143	14.39	31.81	0
Saturated fat[b]	4.94	10.69	89	4.99	18.59	0
Monounsat fat[b]	5.17	9.51	143	5.41	13.96	0
Polyunsat fat[b]	2.68	9.25	90	2.36	16.83	0
Cholesterol	92.10	536.27	238	57.82	858.92	0
Carbohydrate[b]	38.17	69.04	0	36.49	100.00	0.13
Dietary fiber[b]	1.91	6.65	183	1.74	25.27	0
Alcohol[b]	0.93	18.16	3708	0	48.00	0
Vitamin A(IU)	1372.45	12421.70	215	624.37	48601.40	0
Carotenes	101.27	1022.00	299	34.10	2821.59	0
Vitamin E	2.45	13.20	153	1.69	21.38	0
Vitamin C	20.47	157.64	281	10.63	261.91	0
Thiamin	0.36	1.81	116	0.25	3.17	0
Riboflavin	0.44	2.19	101	0.31	4.15	0
Niacin	5.82	27.58	71	4.26	38.82	0
Vitamin B_6	0.39	1.97	138	0.28	3.06	0
Folate	54.65	283.34	84	37.08	789.22	0
Vitamin B_{12}	1.68	27.05	206	0.85	121.57	0
Calcium	198.07	1091.54	6	130.00	2320.02	0
Phosphorus	334.94	1566.86	10	243.34	22511.95	0
Magnesium	65.09	301.24	2	48.61	438.84	0
Iron	3.45	17.73	0	2.53	48.29	0.01
Zinc	3.22	19.82	0	2.22	111.99	0.006
Copper	0.32	1.82	0	0.22	5.94	0.001
Sodium	996.46	4646.79	2	761.87	7157.26	0
Potassium	696.97	3223.86	20	514.96	4775.12	0
III. Food at home (N = 6186)						
Food energy	1342.96	3546.76	0	1264.27	7131.87	5.60
Protein[b]	14.04	20.51	6	13.87	49.62	0
Total fat[b]	13.28	16.48	15	13.46	26.09	0
Saturated fat[b]	4.76	7.67	8	4.72	11.27	0

Table 5. (continued).

	Mean	S.D.	Z[a]	Median	Max.	Min.
Monounsat fat[b]	4.94	6.93	12	4.99	12.18	0
Polyunsat fat[b]	2.51	5.53	8	2.42	9.73	0
Cholesterol	224.66	883.26	33	187.24	1554.30	0
Carbohydrate[b]	39.30	47.16	0	38.87	100.00	4.72
Dietary fiber[b]	2.58	6.69	24	2.36	13.71	0
Alcohol[b]	0.65	14.33	5314	0	45.36	0
Vitamin A(IU)	5072.99	30245.50	21	3254.14	93432	0
Carotenes	345.51	2604.76	36	165.75	9303.17	0
Vitamin E	6.11	27.91	15	5.04	71.40	0
Vitamin C	75.34	345.51	25	58.73	758.54	0
Thiamin	1.07	3.22	11	1.01	8.10	0
Riboflavin	1.37	4.36	8	1.25	12.47	0
Niacin	15.05	43.05	6	14.08	92.04	0
Vitamin B_6	1.22	3.98	11	1.11	10.50	0
Folate	184.39	679.45	4	161.04	1914.36	0
Vitamin B_{12}	4.30	41.03	28	2.96	163.27	0
Calcium	566.39	2027.09	2	492.47	3966.81	0
Phosphorus	879.07	2468.32	1	818.99	4192.67	0
Magnesium	188.79	525.46	1	178.57	833.82	0
Iron	9.95	33.13	1	8.95	82.92	0
Zinc	7.98	31.11	1	7.30	266.06	0
Copper	0.83	2.78	1	0.76	14.22	0
Sodium	2278.29	6963.17	1	2095.36	12316.60	0
Potassium	1909.19	5159.28	0	1827.44	8759.71	0.44

[a]Number of observations that are zeros.
[b]Expressed as nutrient densities or in grams per 1,000 kilocalories.

Note: These statistics are weighted to make the sample representative of the population.

Descriptive Analyses of Nutrient Intakes

Appendix A presents the weighted means across socioeconomic and demographic variables of the daily average nutrient intakes of individuals who had completed 3 days of intake. As shown, the nutrient intake means are presented by degree of urbanization, region, race, (Hispanic) origin, sex, employment status, food stamp participation, special diet variable, and week variable. These variables were previously defined in the "Theory and Methods" section.

In terms of the amount of food energy intake, the mean daily average for all foods is about 1,700 kilocalories for individuals residing in a central city; about 1,800 for individuals residing in a suburban area; and about 1,750 for individuals residing in a nonmetro area. Roughly 30 percent of the number of food energy kilocalories comes from FAFH and the remaining 70 percent from FAH. Mean intakes of food energy are higher for individuals from the South than for individuals from other regions. Blacks have the highest food energy mean intake from FAFH but the lowest food energy intake from FAH. Hispanics, however, have a lower average daily food energy intake from FAFH than do nonhispanics but a higher average daily food energy intake from FAH than do nonhispanics. As expected, males have a higher mean of daily average intake of food energy than do females in all three cases (all foods, FAFH, FAH). Employed individuals average about 645 kilocalories per day from FAFH compared with about 470 kilocalories per day for unemployed individuals. Employed individuals, however, have slightly lower average food energy intakes per day from FAH than do unemployed individuals. Individuals who are neither receiving food stamps nor on special diets have higher average daily intakes of food energy than do their corresponding counterparts.

Individuals residing in the South have lower average intakes of calcium from all foods eaten than do individuals from other regions. Likewise, blacks have a lower average intake of calcium than do whites. These results are consistent with those from the Windham et al. (1983) study, which used the 1977-78 NFCS data set. Incidentally, these results might be related to previous claims that nonwhites, in general, have low levels of intestinal lactase, which is needed to digest milk sugar lactose to galactose and glucose. In the absence of adequate lactase, lactose remains in the intestine to be fermented by bacterial flora, which results in symptoms of gas, bloating, cramping, and osmotic diarrhea.

Average nutrient intakes from FAFH are generally lower than average nutrient intakes from FAH for all demographic variables except total fat per 1,000

Table 6. Means of the independent variables used in the nutrient demand analyses.

Variable	All foods	FAFH	FAH
Urbanization			
Urban1	0.21	0.20	0.21
Urban2	0.49	0.52	0.49
Urban3[a]	0.30	0.28	0.30
Region			
Region1	0.20	0.20	0.20
Region2	0.27	0.28	0.27
Region3[a]	0.35	0.34	0.35
Region4	0.18	0.18	0.18
Race			
Race1[a]	0.86	0.89	0.87
Race2	0.10	0.08	0.10
Race3	0.01	0.01	0.01
Race4	0.03	0.02	0.02
Hispanic origin			
Hisp1	0.04	0.03	0.04
Hisp2[a]	0.96	0.97	0.96
Sex			
Sex1	0.45	0.47	0.45
Sex2[a]	0.55	0.53	0.55
Employment status			
Employ1	0.58	0.67	0.58
Employ2[a]	0.42	0.33	0.42
Food stamp participation			
Fstamp1	0.05	0.04	0.05
Fstamp2[a]	0.95	0.96	0.95
Special diet			
Diet1	0.14	0.12	0.14
Diet2[a]	0.86	0.88	0.86
Week			
Weekend	0.16	0.18	0.16
Weekday[a]	0.84	0.82	0.84
Age	43.33	40.64	43.44
Hsize	3.03	3.02	3.03
Weight	159.48	159.95	159.44
Height	66.72	67.02	66.72
Income	29486.80	32532.10	29472.40

[a]Excluded category in the regression models.

kilocalories, saturated fatty acids per 1,000 kilocalories, monounsaturated fatty acids per 1,000 kilocalories, and polyunsaturated fatty acids per 1,000 kilocalories. The intake of fat and the various fatty acids per 1,000 kilocalories is greater from FAFH than FAH for every demographic variable shown in the table except for Asians/Pacific Islanders and other races and individuals receiving food stamps.

Comparison of absolute levels of nutrients with standards for intake is also needed to assess nutritional well-being. The weighted means of the nutrient intakes as a percentage of the Recommended Dietary Allowances (RDA) by race and by sex and age groups are exhibited in Tables B.1 and B.2 in Appendix B. The RDAs of 16 nutrients included in the NFCS data set are the bases of these percentages. Only 16 of the 28 nutrients used in this report have set RDAs. The RDAs are standards that serve as a goal for good nutrition (National Research Council, 1989). Specifically, the RDAs are recommendations for the average daily amounts of nutrients that population groups should consume over a specific period.

The Committee on Dietary Allowances of the Food and Nutrition Board develops the RDA of various nutrients. Ideally the allowance is developed by first determining the average requirement of a healthy and representative segment of each age group for the nutrient under consideration. The variability among the individuals within the group is assessed *statistically. The amount by which the* average requirement must be increased is then calculated to meet the needs of nearly all healthy individuals. The committee generally sets a recommended allowance for nutrients, other than energy, that is above the average scientifically accepted requirement. Consequently, intakes below the recommended allowance for a nutrient are not necessarily inadequate. Some nutritionists consider group averages of two-thirds of the RDA or less to be at risk of malnutrition in some nutrients. However, many researchers, with the release of the 1989 edition of these RDA standards, now consider 100 percent of the RDA values as bases of assessments. Because the RDAs have not been established for all essential nutrients, only the intakes of 16 out of the 28 nutrients as percentages of the RDA are analyzed in this report.

As shown in Table B.1 in Appendix B, the average intake of nutrients from FAFH as a percentage of the RDA is smaller than the average intake of nutrients from FAH as a percentage of the RDA. On the average, whites have higher intakes of vitamin A, vitamin E, riboflavin, vitamin B_{12}, calcium, phosphorus, magnesium, and iron from FAFH as a percentage of the RDA than do other ethnic groups. Blacks, however, have the highest intake of food energy, protein, vitamin C, thiamin, niacin, vitamin B_6, folate, and zinc from FAFH as percentages of RDAs among the ethnic groups on the average. Asians and Pacific Islanders have the lowest average intake of all 16 nutrients, except calcium, from FAFH as a percentage of the RDA but have the highest average intake of vitamin C and thiamin from FAH as a percentage of the RDA. From food eaten at home, whites have the lowest intake of protein and vitamin C as percentages of RDAs but the highest intakes of vitamin A, riboflavin, vitamin B_6, vitamin B_{12}, and calcium as percentages of RDAs on the average.

For whites, the average intake is roughly 20 percent or more of the RDA from FAFH for each of the 16 nutrients compared with an average intake of about 60 percent or more of the RDA from FAH for all the nutrients. Averages for blacks are mostly 20 percent or more of RDAs from FAFH. Among Asians and Pacific Islanders, average intakes of food energy, thiamin, vitamin B_6, calcium, magnesium, and zinc from FAFH are less than 20 percent of the RDA. Individuals of other races have average intake from FAFH of over 20 percent of RDAs of all 16 nutrients except calcium. From food eaten at home, average intake of almost all nutrients across all the ethnic groups is generally 50 percent or more of the associated RDA.

Considering all foods, the average intake of all 16 nutrients for whites is 66 percent or more of the RDA. For blacks, however, the average intakes of calcium and magnesium are below 66 percent of the RDA. Likewise, the average intake of calcium by Asians/ Pacific Islanders is below 66 percent of the RDA. Calcium, obtained from milk products, is heavily promoted by the dairy industry and the government. However, a fair proportion of the U.S. adult population has some degree of lactose intolerance and finds milk products undesirable. Other sources of calcium (fish, sweet potatoes, corn tortillas, some vegetables) are likewise not widely accepted or eaten in large quantities in the United States (Huffman, 1988). These reasons may account for the below 66 percent of RDA average intake of calcium by some of the ethnic groups. These results seem to hold not only among adults but also among children. Price et al. (1978) discovered in their study of Washington State school children that average nutrient intakes of calcium were relatively lower among blacks and Mexican-Americans compared with those of whites.

Table B.2 in Appendix B presents the mean intakes of nutrients as a percentage of the RDA by sex and age groups. These sex and age groups are the same groups used by the Committee on Dietary Allowances of the Food and Nutrition Board in specifying RDAs. As expected, the average intake of all the 16 nutrients from FAFH as a percentage of the RDA is smaller than the average nutrient intakes from FAH as a percentage of the RDA across all sex and age groups. On the average, males of ages 19 to 24 have the highest average intake of all 16 nutrients from FAFH as a percentage of the RDA except vitamin A, calcium, and phosphorus. Females 51 years of age and over have the highest average intake of vitamin A from FAFH as a percentage of the RDA. Males, on the other hand, 15 to 18 years of age have the highest average intake of calcium from FAFH as a percentage of RDA. Males aged 25 to 50 years have the highest average intake of phosphorus from FAFH as a percentage of the RDA. Across all sex and age groups, the average intake of nutrients from FAH as a percentage of the RDA is generally 50 percent and more. The average intake of nutrients from all foods is also generally 70 percent and more of RDAs by all age groups of males. Average intake of some nutrients from all foods is below 70 percent of RDAs for some of the women groups.

For males aged 15 to 18 years, the average intake is 25 percent or more of the RDA for all the 16 nutrients from FAFH except vitamin B_6 and magnesium. Likewise, the average intake of all nutrients from FAFH is 25 percent or more of the RDA except for vitamin A in males aged 19 to 24 years and for food energy, vitamin B_6, and magnesium in males in the 25- to 50-years range. Males who are 51 years or more have average intakes of food energy, vitamin E, vitamin B_6, folate, calcium, magnesium, and zinc from FAFH below 25 percent of the RDA. For females, most of the average intake of nutrients from FAFH are 25 percent or more of the RDA except for vitamins E and B_6, calcium, magnesium, iron, and zinc in the 15- to 18-years age group; except for vitamins A and B_6, calcium, magnesium, and iron in the 19- to 24-years age group; except for food energy, vitamin B_6, calcium, magnesium, iron, and zinc in the 25- to 50-years age group; and except for food energy, thiamin, vitamin B_6, folate, calcium, magnesium, iron, and zinc in the 51 and older age group. Except for vitamin B_{12}, the average intake of all nutrients from FAFH by pregnant women is below 25 percent of the RDA.

Table B.3 in Appendix B shows the weighted means of nutrient intakes as a percentage of RDA for selected population groups. Generally, individuals residing in suburban areas have slightly higher intakes of food energy; protein; vitamins E, C, B_6, and B_{12}; thiamin; niacin; calcium; phosphorus; magnesium; iron; and zinc from FAFH as a percentage of RDA than do individuals residing in either central cities or nonmetro areas. On the average, individuals from either central cities, suburban or nonmetro areas have intakes of 25 percent or more of the RDA from FAFH except food energy, vitamin B_6, calcium, magnesium, and zinc. Not many differences of nutrient intakes as a percentage of the RDA, however, are evident between various groups of individuals across the urbanization variables.

In terms of regional differences, individuals from the South have the highest intake of food energy, protein, vitamin E, thiamin, riboflavin, niacin, vitamin B_6, folate, phosphorus, magnesium, iron, and zinc from FAFH as a percentage of the RDA compared with individuals from either the Northeast, Midwest, or West. Employed individuals have higher intakes of all the 16 nutrients from FAFH as a percentage of the RDA than do unemployed individuals. In contrast, unemployed individuals have higher intakes of all the 16 nutrients from FAH as a percentage of the RDA than do employed individuals.

Food stamp nonrecipients have generally higher intakes of all the nutrients from either all foods eaten or FAFH as a percentage of the RDA than do food stamp recipients. Food stamp recipients, however, have slightly higher intakes of food energy, protein, thiamin, niacin, vitamin B_{12}, and zinc from FAH as a percentage of the RDA than do food stamp nonrecipients.

For FAFH, individuals on special diets have lower intakes of all the 16 nutrients as a percentage of the RDA except for vitamin A than do individuals who are not on special diets. On the other hand, individuals on special diets have higher intakes of vitamins A, E, B_6, and C; thiamin; riboflavin; niacin; folate; calcium; phosphorus; magnesium; and iron but lower intakes of food energy, protein, vitamin B_{12}, and zinc from FAH as a percentage of the RDA than do individuals not on special diets. Considering all foods eaten, individuals not on special diets have higher intakes of all 16 nutrients as a percentage of the RDA except vitamins A and C, niacin, folate, and magnesium than do individuals on special diets.

Regression Analyses of Nutrient Intakes

Results of the effects of various socioeconomic and demographic variables on intakes of 28 nutrients from 3 different sources — FAFH, FAH, and all foods — are exhibited in Appendix C. Because of the complex influences on individual nutrient consumption and the cross-sectional nature of the data, the adjusted R-squares, as expected, are relatively low. The adjusted R-squares across the models range from 0.0172 (vitamin B_{12}) to 0.2714 (sodium) using all foods data, from 0.0111 (vitamin B_{12}) to 0.1294 (food energy) using FAFH data, and from 0.0121 (vitamin B_{12}) to 0.1917 (sodium) using FAH data. The significance level used throughout the analysis is 0.05.

A problem in the estimation of regression models using cross-sectional data is heteroskedasticity in the error terms. When heteroskedasticity is present, ordinary least squares (OLS) estimation places more weight on the observations that have large error variances than on those with small error variances. Because of this implicit weighting, OLS parameter estimates are unbiased and consistent, but they are not efficient (Pindyck and Rubinfeld, 1991). To detect the presence of heteroskedasticity, the Breusch-Pagan-Godfrey (BPG) test is used in all the nutrient demand equations except the alcohol regressions where a significant part of the observations in the dependent variable is zero. Details of the BPG test are discussed in the "Theory and Methods" section of this report. Heteroskedasticity is found in all the 27 regressions analyzed for the all foods data set except vitamin A, carotenes, and zinc equations. Similarly, heteroskedasticity is found in almost all the 27 regressions using the FAFH data except dietary fiber, vitamin B_{12}, and zinc equations and in almost all the 27 regressions using the FAH data except vitamin A, carotenes, and zinc equations. Weighted least squares (WLS) is used for those equations found to have heteroskedastic error terms.

A substantial part (more than 80 percent of the total observations) of the all-foods, FAFH, and FAH data series has zero intakes of alcohol (see Table 5). In these cases, the use of OLS would result in biased and inconsistent estimates. Deleting these individuals and using OLS would not solve the problem of inconsistency and would only reduce the efficiency of the estimates because of a smaller sample size. For this reason, the Heckman sample selection procedure is used for each of the three alcohol regressions. Probit analysis is used in the first stage of the Heckman procedure and the dependent variable is given a value of one if there is alcohol intake and a value of zero if there is no alcohol intake. The inverse of Mill's ratio, which would indicate the sample selection bias, is then calculated for each observation and is incorporated as an independent variable in the second stage. In the second stage of the Heckman procedure, OLS is used only on the nonzero observations in the dependent variable.

No heteroskedasticity tests were performed in the alcohol equations because the error structure of the equation used in the second stage of the Heckman procedure is explicitly heteroskedastic. Consequently, the use of OLS in the second stage of the Heckman procedure produces consistent estimates, but generalized least squares, when implementation is possible, improves the precision of the estimates. As mentioned, the technique developed to correct for heteroskedasticity in the Heckman procedure may break down when the estimate of σ_{11} is nonpositive or the estimate of ρ^2 does not lie in the unit interval. Incidentally, the estimates of ρ^2 in the alcohol regressions do not lie in the unit interval. Hence, OLS, in this case, is used in the second stage of the Heckman procedure.

The coefficient associated with the inverse of Mill's ratio (IMRATIO) is not significant in the FAH but is significant in the all-foods and FAFH models. This significance indicates that sample selection bias could have been introduced in the estimates if the observations with zero alcohol consumption were deleted and not used in the analysis.

Adrian and Daniel (1976) noted that urbanization may reflect the impact of various factors like the potential for home food production; accessibility to diverse types of restaurants and stores; distinctions in the social, cultural, and economic environment such as occupational and educational opportunities; and the effects of mass media. Certainly, for FAFH, accessibility to diverse types of restaurants and stores could be a major factor reflected in the urbanization variables. The excluded category in all the regressions is urban3, or individuals residing in nonmetro areas. Significant differences across different degrees of urbanization are found in the demand for total fats, saturated fatty acids, monounsaturated fatty acids, alcohol, and vitamin A from FAFH. Individuals who reside in central cities or suburban areas have intakes with lower amounts of fat, saturated fatty acids, and monounsaturated fatty acids per 1,000 kilocalories from FAFH than do those individuals from nonmetro areas. Generally, individuals who reside in nonmetro areas consume more fat, saturated fatty acids, and monounsaturated fatty acids per 1,000 kilocalories from either FAFH, FAH, or all foods than do individuals who reside in urban areas. The vitamin A regression results, however, tell a different story. Individuals from central cities (suburban areas) consume more (less) amounts of vitamin A than individuals residing in nonmetro areas. These results are consistent with those of Adrian and Daniel (1976). Their results indicate that farm households consume more of all nutrients except vitamin A and C than do urban households. Based on the Heckman procedure estimates, individuals residing in central cities (suburban areas) have higher intakes of alcohol per 1,000 kilocalories from FAFH (FAH) than do individuals residing in nonmetro areas.

The joint F-tests conducted indicate that significant regional differences are evident in the consumption of the following nutrients from FAFH: food energy, fat, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, carbohydrate, dietary fiber, vitamin A, carotenes, vitamin E, vitamin C, thiamin, niacin, folate, calcium, phosphorus, iron, sodium, and zinc. The excluded category in all the equations is region3, or the South. Individuals in the Northeast consume more saturated fatty acids per 1,000 kilocalories but less monounsaturated fatty acids per 1,000 kilocalories, polyunsaturated fatty acids per 1,000 kilocalories, dietary fiber per 1,000 kilocalories, vitamin E, and sodium from FAFH than do individuals from the South. Individuals from the Midwest, however, consume more fat per 1,000 kilocalories, saturated fatty acids per 1,000 kilocalories and less food energy, polyunsaturated fatty acids per 1,000 kilocalories, carbohydrate per 1,000 kilocalories, vitamin A, carotenes, vitamin E, thiamin, folate, and iron from FAFH than do individuals from the South. Individuals from the South also consume more food energy, vitamin E, thiamin, niacin, calcium, phosphorus, iron, zinc, and sodium but less dietary fiber per 1,000 kilocalories and vitamin C than do individuals from the West. Thus, individuals from the South seem to generally consume more amounts of various nutrients from FAFH than do individuals from the Northeast, Midwest, or the West. On the other hand, although the joint F-test for regions in the alcohol regression using FAFH data indicates no significance of the regional variables, the individual effects of the regions are significant. In particular, individuals from the Northeast, Midwest, and the West consume more alcohol per 1,000 kilocalories away from home than do individuals from the South.

In contrast, individuals from the South consume less alcohol per 1,000 kilocalories at home than do individuals from other regions. However, individuals from the South generally consume less of the other 27 nutrients from FAH and all foods eaten than do individuals from other regions. Specifically, individuals from the Northeast and West have higher intakes of saturated fatty acids per 1,000 kilocalories, vitamin A, carotenes, vitamin C, and calcium from either FAH or all foods eaten than do individuals from the South. Moreover, individuals from the Midwest have higher intakes of fat and saturated fatty acids per 1,000 kilocalories, calcium, and potassium from either FAH or all foods eaten than do individuals from the South.

The results also suggest that some nutrient intakes differ by race of the individual. For instance, races differ significantly in the intake of saturated fatty acids per 1,000 kilocalories, vitamin A, carotenes, vitamin C, niacin, and copper from FAFH. In particular, from FAFH, whites consume less vitamin C and niacin than do blacks; less carotenes than do Asians/Pacific Islanders; and less vitamin A, niacin, and copper than do individuals of other races. However, whites consume more saturated fatty acids per 1,000 kilocalories, vitamin A, and carotenes from FAFH than do blacks.

More significant differences in terms of nutrient intake across the races are evident from the FAH and all-foods models. Incidentally, these differences across races are basically the same for both the FAH models and all-foods models. In general, whites consume more dietary fiber and saturated fatty acids per 1,000 kilocalories, carotenes, vitamin E, thiamin, riboflavin, vitamin B_6, calcium, phosphorus, magnesium, and iron than do blacks from either FAH or all foods eaten. Similarly, whites consume more saturated and monounsaturated fatty acids per 1,000 kilocalories and more calcium but less cholesterol, carotenes, and vitamin C from either FAH or all foods eaten than do Asians/Pacific Islanders. Whites also consume less cholesterol, dietary fiber per 1,000 kilocalories, vitamin C, thiamin, niacin, vitamin B_6, folate, and potassium from either FAH or all foods eaten than do other race individuals. These results differ from those of Scearce and Jensen (1979) who found no significant relationship between race and the demand for various nutrients.

Hispanics tend to have the same consumption of nutrients from FAFH as the nonhispanics except for copper, of which Hispanics consume significantly less. Hispanics also consume more protein and dietary fiber per 1,000 kilocalories, cholesterol, and folate but less fat, saturated fatty acids, and polyunsaturated fatty acids per 1,000 kilocalories, riboflavin, and calcium from all foods eaten than do nonhispanics. From FAH, Hispanics consume more protein and dietary fiber per 1,000 kilocalories, cholesterol, folate, and magnesium but less saturated and polyunsaturated fatty acids per 1,000 kilocalories and calcium than do nonhispanics.

Consumption of alcohol per 1,000 kilocalories; food energy; cholesterol; vitamins E, C, B_6, and B_{12}; thiamin; riboflavin; niacin; folate; calcium; phosphorus; magnesium; iron; zinc; copper; sodium; and potassium from FAFH is significantly greater for males than females. Males also generally consume more of these same nutrients with the addition of fats and monounsaturated fatty acids per 1,000 kilocalories from either FAH or all foods eaten than do females. Females, however, have higher intakes of fat and all the fatty acids per 1,000 kilocalories from FAFH and more carbohydrate and dietary fiber per 1,000 kilocalories from either FAH or all foods eaten than do males.

Employed individuals consume less of only 2 of the 28 nutrients from FAFH analyzed than do individuals without employment. These nutrients are dietary fiber and alcohol per 1,000 kilocalories. From food eaten at home, however, employed individuals do not consume significantly more of any nutrient than do unemployed individuals. In contrast to the FAFH results, employed individuals consume significantly less food energy; cholesterol; vitamins A, C, E, and B_6; carotenes; thiamin; riboflavin; niacin; folate; calcium; phosphorus; magnesium; iron; zinc; copper; sodium; and potassium from FAH than do unemployed individuals. In terms of all the foods eaten, employed individuals consume more fats, monounsaturated, and polyunsaturated fatty acids per 1,000 kilocalories but less carbohydrate and dietary fiber per 1,000 kilocalories; vitamins A, C, and B_6; riboflavin; folate; calcium; magnesium; and potassium than do unemployed individuals.

Individuals receiving food stamps do not consume significantly more of any nutrient from FAFH than do individuals who are not receiving food stamps. Those individuals who receive food stamps, however, consume significantly less fat, saturated a[nd] polyunsaturated fatty acids per 1,000 kilocalories; food energy; vitamin E; calcium; and phosphorus from FAFH than do those who are not receiving food stamps. In contrast, those who are receiving food stamps consume more alcohol, vitamin B_{12}, and copper but less carotenes and vitamin C from either FAH or all foods eaten than do food stamp nonrecipients. The results using the all-foods data set are not quite the same as those from the Scearce and Jensen study in 1979. Using the 1972-73 Consumer Expenditure Survey of the Bureau of Labor Statistics, their results indicate that the food-stamp-participating families purchased a greater amount of food energy, protein, calcium, iron, vitamin A, and vitamin B_1 than did nonparticipating families.

Individuals on special diets do not consume significantly more of any nutrient from FAFH except protein, polyunsaturated fatty acids, and dietary fiber per 1,000 kilocalories than do those individuals who are not on a special diet. As expected, individuals who are on a special diet consume significantly less food energy; saturated fatty acids and carbohydrate per 1,000 kilocalories; cholesterol; vitamins E, B_6, and B_{12}; thiamin; riboflavin; niacin; folate; calcium; phosphorus; magnesium; iron; zinc; copper; sodium; an[d] potassium from FAFH than do individuals not on a niacin than do blacks; less carotenes than do Asians/ Pacific Islanders; and less vitamin A, niacin, and copper than do individuals of other races. However, whites consume more saturated fatty acids per 1,000 kilocalories, vitamin A, and carotenes from FAFH than do blacks.

More significant differences in terms of nutrient intake across the races are evident from the FAH and all-foods models. Incidentally, these differences across races are basically the same for both the FAH models and all-foods models. In general, whites consume more dietary fiber and saturated fatty acids per 1,000 kilocalories, carotenes, vitamin E, thiamin, riboflavin, vitamin B_6, calcium, phosphorus, magnesium, and iron than do blacks from either FAH or all foods eaten. Similarly, whites consume more saturated and monounsaturated fatty acids per 1,000 kilocalories and more calcium but less cholesterol, carotenes, and vitamin C from either FAH or all foods eaten than do Asians/Pacific Islanders. Whites also consume less cholesterol, dietary fiber per 1,000 kilocalories, vitamin C, thiamin, niacin, vitamin B_6, folate, and potassium from either FAH or all foods eaten than do other race individuals. These results differ from those of Scearce and Jensen (1979) who found no significant relationship between race and the demand for various nutrients.

Hispanics tend to have the same consumption of nutrients from FAFH as the nonhispanics except for copper, of which Hispanics consume significantly less. Hispanics also consume more protein and dietary fiber per 1,000 kilocalories, cholesterol, and folate but less fat, saturated fatty acids, and polyunsaturated fatty acids per 1,000 kilocalories, riboflavin, and calcium from all foods eaten than do nonhispanics. From FAH, Hispanics consume more protein and dietary fiber per 1,000 kilocalories, cholesterol, folate, and magnesium but less saturated and polyunsaturated fatty acids per 1,000 kilocalories and calcium than do nonhispanics.

Consumption of alcohol per 1,000 kilocalories; food energy; cholesterol; vitamins E, C, B_6, and B_{12}; thiamin; riboflavin; niacin; folate; calcium; phosphorus; magnesium; iron; zinc; copper; sodium; and potassium from FAFH is significantly greater for males than females. Males also generally consume more of these same nutrients with the addition of fats and monounsaturated fatty acids per 1,000 kilocalories from either FAH or all foods eaten than do females. Females, however, have higher intakes of fat and all the fatty acids per 1,000 kilocalories from FAFH and more carbohydrate and dietary fiber per 1,000 kilocalories from either FAH or all foods eaten than do males.

Employed individuals consume less of only 2 of the 28 nutrients from FAFH analyzed than do individuals without employment. These nutrients are dietary fiber and alcohol per 1,000 kilocalories. From food eaten at home, however, employed individuals do not consume significantly more of any nutrient than do unemployed individuals. In contrast to the FAFH results, employed individuals consume significantly less food energy; cholesterol; vitamins A, C, E, and B_6; carotenes; thiamin; riboflavin; niacin; folate; calcium; phosphorus; magnesium; iron; zinc; copper; sodium; and potassium from FAH than do unemployed individuals. In terms of all the foods eaten, employed individuals consume more fats, monounsaturated, and polyunsaturated fatty acids per 1,000 kilocalories but less carbohydrate and dietary fiber per 1,000 kilocalories; vitamins A, C, and B_6; riboflavin; folate; calcium; magnesium; and potassium than do unemployed individuals.

Individuals receiving food stamps do not consume significantly more of any nutrient from FAFH than do individuals who are not receiving food stamps. Those individuals who receive food stamps, however, consume significantly less fat, saturated and polyunsaturated fatty acids per 1,000 kilocalories; food energy; vitamin E; calcium; and phosphorus from FAFH than do those who are not receiving food stamps. In contrast, those who are receiving food stamps consume more alcohol, vitamin B_{12}, and copper but less carotenes and vitamin C from either FAH or all foods eaten than do food stamp nonrecipients. The results using the all-foods data set are not quite the same as those from the Scearce and Jensen study in 1979. Using the 1972-73 Consumer Expenditure Survey of the Bureau of Labor Statistics, their results indicate that the food-stamp-participating families purchased a greater amount of food energy, protein, calcium, iron, vitamin A, and vitamin B_1 than did nonparticipating families.

Individuals on special diets do not consume significantly more of any nutrient from FAFH except protein, polyunsaturated fatty acids, and dietary fiber per 1,000 kilocalories than do those individuals who are not on a special diet. As expected, individuals who are on a special diet consume significantly less food energy; saturated fatty acids and carbohydrate per 1,000 kilocalories; cholesterol; vitamins E, B_6, and B_{12}; thiamin; riboflavin; niacin; folate; calcium; phosphorus; magnesium; iron; zinc; copper; sodium; and potassium from FAFH than do individuals not on a special diet. However, from food eaten at home, individuals who are on a special diet consume more protein and dietary fiber per 1,000 kilocalories; carbohydrate; vitamins A, C, and B_6; carotenes; folate; magnesium; and potassium but less fat, saturated and monounsaturated fatty acids per 1,000 kilocalories, food energy, cholesterol, zinc, and sodium than do individuals not on special diets. If all the foods eaten are considered, individuals who are on special diets consume more protein and dietary fiber per 1,000 kilocalories, carbohydrate, vitamins A and C, carotenes, folate, and copper but less fat, saturated and monounsaturated fatty acids per 1,000 kilocalories, food energy, cholesterol, thiamin, vitamin B_{12}, iron, zinc, and sodium than do individuals who are not on special diets.

Intakes of individuals during the weekend are significantly higher in vitamin B_6, zinc, and copper from FAFH than intakes of individuals during the week. On the other hand, for the FAH, intakes of individuals during the weekend are significantly higher in cholesterol but significantly lower in protein and dietary fiber per 1,000 kilocalories; vitamins A, C, and B_6; carotenes; niacin; folate; magnesium; copper; and potassium than intakes of individuals during the week. If all the foods eaten are considered, intakes of individuals during the weekend are significantly greater in food energy, cholesterol, and zinc but significantly less in protein and dietary fiber per 1,000 kilocalories, vitamins A and C, and carotenes than intakes of individuals during the week.

A positive relationship is noted between the weight of an individual and food energy, monounsaturated fatty acids per 1,000 kilocalories, cholesterol, vitamins E and B_6, thiamin, riboflavin, niacin, folate, calcium, phosphorus, magnesium, iron, zinc, copper, sodium, and potassium consumption from FAFH. Positive relationships also exist between the weight of an individual and protein per 1,000 kilocalories, cholesterol, zinc, and sodium consumption from FAH and between weight of an individual and food energy, protein and monounsaturated fatty acids per 1,000 kilocalories, cholesterol, thiamin, ribo-flavin, niacin, vitamins B_6 and B_{12}, phosphorus, iron, zinc, and sodium consumption from all food eaten. An inverse relationship, however, is reflected between the weight of an individual and the consumption of the following nutrients: carbohydrate per 1,000 kilocalories from either FAFH, FAH, or all foods eaten, dietary fiber per 1,000 kilocalories from either FAH or all foods eaten, and polyunsaturated fatty acids per 1,000 kilocalories and copper from all foods eaten.

Results generally indicate that an increase in household size is associated with an increase in nutrient consumption from FAH but a decrease in nutrient consumption from FAFH. These results are consistent with the results of Adrian and Daniel (1976) using the 1965-66 NFCS data set. Specifically, a negative relationship exists between household size and protein, polyunsaturated fatty acids, and dietary fiber per 1,000 kilocalories; food energy; cholesterol; vitamins A, E, C, B_6, and B_{12}; carotenes; thiamin; riboflavin; niacin; folate; calcium; phosphorus; magnesium; iron; zinc; copper; sodium; and potassium consumption from FAFH. Conversely, a positive relationship is found between household size and fat, saturated and monounsaturated fatty acids per 1,000 kilocalories; food energy, cholesterol, thiamin, riboflavin, niacin, calcium, phosphorus, magnesium, iron, zinc, sodium, and potassium consumption from FAH. If all foods eaten are considered, a negative relationship is found between household size and polyunsaturated fatty acids, alcohol, and dietary fiber per 1,000 kilocalories; vitamins A, E, C, and B6; carotenes; niacin; folate; calcium; phosphorus; magnesium; copper; and potassium consumption. A positive relationship is found between household size and fat and monounsaturated fatty acids per 1,000 kilocalories and sodium consumption from all foods eaten. Similarly, Chavas and Keplinger (1983) using the 1977-78 NFCS data set found that individual nutrient intake decreases significantly with household size.

Age of the individual is generally a significant factor affecting individual consumption of many nutrients either from FAFH, FAH, or all foods eaten. Consumption of almost all the nutrients from FAFH except for some of the energy-yielding nutrients decreases initially with successive increments of age and then increases, as indicated by the significant negative and positive signs of the age and age-squared coefficients, respectively. The relationship of consumption behavior with age of the individual is generally the opposite for foods eaten at home. For instance, as evidenced by the significant positive and negative signs of the age and age-squared coefficients, respectively, consumption of protein, fat, monounsaturated and polyunsaturated fatty acids per 1,000 kilocalories, food energy, cholesterol, carotenes, niacin, magnesium, zinc, copper, and potassium from FAH increases initially, then peaks, and then decreases with further increments of age of the individual. Age coefficients from the models for dietary fiber per 1,000 kilocalories, vitamin A, iron, and sodium from FAH are positive and significant, but the age-squared coefficients are not. Less uniformity in the nutrient consumption patterns in relation to the age variable is found using all foods eaten. In particular, a significant positive sign on the age variable and a significant negative sign on the age-squared variable is found on protein, dietary fiber, fats, monounsaturated and polyunsaturated fatty acids per 1,000 kilocalories, magnesium, copper, and potassium consumption models. Conversely, a significant negative sign on the age variable and a significant positive sign on the age-squared variable is found on carbohydrate per 1,000 kilocalories, food energy, thiamin, vitamins B_6 and B_{12}, folate, calcium, phosphorus, iron, and sodium consumption models.

Nonlinear consumption patterns are also reflected in some of the significant coefficients of the income and the income-squared variables. Household income is more of a significant factor affecting individual consumption of nutrients from FAFH than from either FAH or all foods eaten as evidenced by the number of significant coefficients. Moreover, the general pattern of nutrient consumption from FAFH typically starts with an increase and then declines with successive positive increments of income, as indicated by the significant positive and negative signs of the income and income-squared coefficients. This consumption pattern is evident in the following consumption models from FAFH: protein, fat, saturated fatty acids, monounsaturated and polyunsaturated fatty acids and dietary fiber per 1,000 kilocalories, food energy, thiamin, riboflavin, niacin, folate, magnesium, iron, and sodium. Consumption models from FAFH with a significant and positive income coefficient but insignificant income-squared coefficient are alcohol; vitamins A, E, C, and B_6; carotenes; calcium; phosphorus; copper; and potassium. In contrast, the general pattern of nutrient consumption from FAH starts with a decrease and then increases with successive increments of income. Individual consumption of food energy, cholesterol, riboflavin, niacin, phosphorus, and sodium from FAH depicts this same pattern with increases in household income. In the models for monounsaturated fatty acid per 1,000 kilocalories, phosphorus, iron, zinc, and potassium consumption from FAH, coefficients are negative and significant for the income term but insignificant on the income-squared term. If all the foods eaten are considered, the consumption of carotenes, vitamins E and C, and copper initially increases and then decreases with successive increments in income. The coefficients associated with the income-squared term in the models for polyunsaturated fatty acid and dietary fiber per 1,000 kilocalories, vitamins A and B6, folate, magnesium, and potassium from all foods eaten are not statistically significant although the income ter[illegible] are positive and significant. In general, these resul[illegible] contrast to those of the Windham et al. (1983) study, which used the 1977-78 NFCS data set. Their results indicate that income had no statistically significant effect upon the nutritional quality of the diets.

Conclusions

Heightened consumer interest in health and nutrition has increased the need for a complete understanding of nutrient consumption patterns not only from food eaten at home but also from food eaten away from home. Moreover, food consumption relationships are traditionally specified between socioeconomic factors and quantity or expenditure measures. These approaches, however, do not allow inferences regarding the nutritional status of an individual's diet. On the other hand, although considerable literature exists on demand models for nutrients, little attention is paid to the analysis of the demand for nutrients derived from either FAFH or FAH.

In this light, this study evaluates individual nutrient consumption to provide a comprehensive description and understanding of nutrient consumption patterns not only from total food consumption but also from FAFH and FAH. In addition, the information obtained from this study could be used as a guide by nutrition educators and policy makers in the design and development of nutrition educational programs.

The results in this study generally indicate that average nutrient intakes from FAFH are lower than average nutrient intakes from FAH except for fat, saturated fatty acids, monounsaturated fatty acids, and polyunsaturated fatty acids. This information has important implications for the away-from-home food industry. The fast food industry, for instance, has been criticized for serving foods that have "unhealthy" high-fat content. However, as more consumers demand more nutritious menu items, FAFH operators, to stay competitive, will have to adapt to these nutrition-conscious patrons. Some of the fast food chains have, however, started to respond positively to the demand of the customers for healthier and low-fat food.

Except for the intake of calcium and magnesium by certain population groups, the individuals in the sample seem to have generally acquired at least two-age-squared coefficients are not. Less uniformity in the nutrient consumption patterns in relation to the age variable is found using all foods eaten. In particular, a significant positive sign on the age variable and a significant negative sign on the age-squared variable is found on protein, dietary fiber, fats, monounsaturated and polyunsaturated fatty acids per 1,000 kilocalories, magnesium, copper, and potassium consumption models. Conversely, a significant negative sign on the age variable and a significant positive sign on the age-squared variable is found on carbohydrate per 1,000 kilocalories, food energy, thiamin, vitamins B_6 and B_{12}, folate, calcium, phosphorus, iron, and sodium consumption models.

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Except for the intake of calcium and magnesium by certain population groups, the individuals in the sample seem to have generally acquired at least two-thirds of the recommended daily allowances from all foods, which indicate that these individuals are ...cally consuming adequate diets. Moreover, results ...rally indicate that distinct differences exist between the type of socioeconomic and demographic characteristics that significantly affect the intake of nutrients from food away from home and food at home. These findings illustrate the importance of socioeconomic and demographic variables in nutrient consumption models.

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APPENDIX A

Means of Average Daily Nutrient Intake for Individuals Across Population Groups

Demographic Variables	FOOD ENERGY			PROTEIN			FAT			SAT. FAT ACIDS		
	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
	(KILOCALORIES)			(GRAMS/1000 KC)			(GRAMS/1000 KC)			(GRAMS/1000 KC)		
Urbanization												
Urban	1679.93	579.16	1282.86	14.13	12.74	14.24	13.27	13.56	12.81	4.72	4.88	4.56
Suburban	1792.29	609.52	1347.41	13.88	13.11	13.95	13.65	13.80	13.28	4.86	4.93	4.75
Non-Metro	1759.97	586.76	1382.66	13.93	12.72	14.08	13.93	14.28	13.64	5.00	5.03	4.96
Region												
Northeast	1708.59	567.77	1319.41	14.10	13.45	14.14	13.63	13.71	13.23	4.98	5.17	4.82
Midwest	1743.28	599.31	1312.12	13.89	13.03	13.88	13.98	14.51	13.62	5.07	5.22	4.97
South	1812.59	628.99	1375.70	13.91	13.04	13.94	13.54	13.79	13.11	4.69	4.70	4.59
West	1748.11	574.32	1350.18	13.91	12.12	14.31	13.41	13.38	13.16	4.81	4.76	4.77
Race												
White	1769.80	598.34	1340.04	13.89	13.00	14.00	13.68	14.01	13.29	4.92	4.99	4.80
Black	1672.33	605.65	1309.46	14.17	12.86	14.18	13.28	13.07	13.06	4.56	4.53	4.49
Asian/Pac	1738.62	490.17	1382.10	13.86	11.26	14.39	13.72	13.92	14.03	4.39	5.79	4.47
Other	1829.68	580.69	1559.95	14.59	11.49	14.87	13.80	13.16	13.53	4.74	4.44	4.69
Origin												
Hispanic	1845.41	501.35	1565.49	15.09	14.32	14.94	13.32	13.63	12.98	4.54	4.55	4.49
Nonhisp	1757.82	600.23	1335.83	13.91	12.90	14.01	13.65	13.87	13.28	4.88	4.95	4.77
Sex												
Male	2084.17	723.23	1551.90	13.86	12.76	13.93	13.80	13.71	13.43	4.91	4.95	4.79
Female	1467.12	472.47	1153.47	14.02	13.11	14.14	13.50	14.03	13.14	4.83	4.94	4.74
Employment												
Employed	1839.36	646.71	1324.95	13.85	12.84	13.95	13.74	13.81	13.30	4.90	4.90	4.78
Not emp	1621.91	468.98	1374.52	14.11	13.18	14.19	13.46	14.02	13.23	4.81	5.06	4.75
Food Stamp												
Receiving	1556.56	493.51	1341.80	14.74	12.66	14.84	13.43	12.16	13.41	4.68	4.43	4.64
Not	1771.92	601.35	1343.02	13.90	12.95	14.00	13.65	13.93	13.27	4.88	4.96	4.77
Special Diet												
Yes	1475.19	419.48	1206.57	15.16	14.32	15.34	12.92	13.94	12.38	4.43	4.68	4.27
No	1803.23	621.72	1363.46	13.76	12.75	13.85	13.75	13.86	13.41	4.93	4.98	4.84
WEEK												
Weekend	1831.88	609.85	1364.19	13.66	13.07	13.69	13.57	13.80	13.24	4.87	4.96	4.78
Weekday	1730.38	592.03	1333.97	14.06	12.87	14.19	13.67	13.90	13.29	4.87	4.93	4.76

Demographic Variables	MONO FAT ACIDS ALL	MONO FAT ACIDS FAFH	MONO FAT ACIDS FAH	POLY FAT ACIDS ALL	POLY FAT ACIDS FAFH	POLY FAT ACIDS FAH	CHOLESTEROL ALL	CHOLESTEROL FAFH	CHOLESTEROL FAH	CARBOHYDRATE ALL	CARBOHYDRATE FAFH	CARBOHYDRATE FAH
	(GRAMS/1000 KC)			(GRAMS/1000 KC)			(MILLIGRAMS)			(GRAMS/1000 KC)		
Urbanization												
Urban	4.94	5.03	4.75	2.54	2.62	2.45	278.84	87.57	218.91	38.88	38.65	40.13
Suburban	5.07	5.13	4.91	2.63	2.66	2.56	288.14	95.11	218.75	38.28	38.01	39.13
Non-Metro	5.27	5.36	5.15	2.57	2.77	2.47	298.55	89.03	241.70	38.28	38.12	38.98
Region												
Northeast	4.98	4.95	4.84	2.57	2.54	2.51	278.55	92.55	215.11	38.14	37.96	39.01
Midwest	5.20	5.42	5.03	2.62	2.72	2.56	268.55	88.78	204.70	37.91	36.52	39.11
South	5.15	5.23	4.97	2.61	2.77	2.49	309.25	98.50	241.03	38.64	38.50	39.53
West	4.97	4.96	4.85	2.57	2.62	2.49	290.03	84.90	231.53	38.88	39.84	39.45
Race												
White	5.08	5.19	4.91	2.61	2.71	2.52	282.46	92.03	216.40	38.39	37.81	39.41
Black	5.14	5.09	5.05	2.47	2.42	2.42	319.69	98.72	261.42	38.69	40.58	38.80
Asian/Pac	5.20	4.93	5.32	3.08	2.25	3.15	328.93	63.72	282.58	36.16	36.93	36.38
Other	5.28	4.76	5.20	2.62	2.95	2.48	353.40	75.89	323.12	38.17	41.86	38.72
Origin												
Hispanic	5.11	5.06	4.97	2.52	2.94	2.38	366.97	80.90	321.99	37.99	37.69	39.10
Nonhisp	5.09	5.17	4.93	2.60	2.67	2.52	286.39	92.38	221.55	38.42	38.18	39.31
Sex												
Male	5.21	5.13	5.05	2.57	2.53	2.51	343.25	109.66	262.72	37.58	38.13	38.51
Female	4.99	5.20	4.83	2.61	2.83	2.52	239.60	74.55	190.16	39.16	38.20	40.03
Employment												
Employed	5.12	5.14	4.93	2.63	2.70	2.52	297.08	98.22	219.08	37.94	38.37	38.98
Not emp	5.04	5.23	4.94	2.53	2.63	2.48	274.47	75.95	234.46	39.20	37.63	39.86
Food Stamp												
Receiving	5.18	4.71	5.17	2.45	2.01	2.50	285.01	76.94	251.67	38.20	42.05	38.27
Not	5.08	5.18	4.92	2.60	2.70	2.51	289.10	92.61	223.15	38.41	38.03	39.36
Special Diet												
Yes	4.75	5.06	4.56	2.67	3.10	2.52	243.12	69.88	198.36	39.44	36.50	40.83
No	5.14	5.18	4.99	2.58	2.63	2.51	295.73	95.08	228.62	38.25	38.39	39.07
WEEK												
Weekend	5.07	5.12	4.93	2.53	2.64	2.46	307.77	96.11	234.15	38.43	37.82	39.42
Weekday	5.09	5.19	4.94	2.62	2.70	2.53	280.91	90.17	220.65	38.39	38.33	39.26

Demographic Variables	DIETARY FIBER ALL	DIETARY FIBER FAFH	DIETARY FIBER FAH	ALCOHOL ALL	ALCOHOL FAFH	ALCOHOL FAH	VIT A-IU ALL	VIT A-IU FAFH	VIT A-IU FAH	CAROTENES ALL	CAROTENES FAFH	CAROTENES FAH
	(GRAMS/1000 KC)			(GRAMS/1000 KC)			(INTER. UNITS)			(MICROGRAMS RE)		
Urbanization												
Urban	2.45	1.94	2.53	0.76	1.13	0.62	6468.53	1454.64	5481.59	451.86	107.66	378.69
Suburban	2.48	1.88	2.66	0.82	1.01	0.84	6092.64	1368.33	5102.27	427.73	100.87	354.64
Non-Metro	2.38	1.97	2.44	0.34	0.58	0.27	5502.95	1313.03	4678.68	360.75	96.82	299.39
Region												
Northeast	2.38	1.85	2.48	0.76	0.93	0.82	6331.98	1562.56	5270.04	451.61	119.84	369.97
Midwest	2.40	1.93	2.51	0.56	0.97	0.41	6089.24	1322.09	5141.79	411.02	92.68	344.57
South	2.44	1.87	2.62	0.62	0.72	0.71	5546.16	1282.66	4669.87	368.43	94.19	303.77
West	2.58	2.04	2.70	0.85	1.22	0.67	6405.56	1389.50	5465.85	462.69	104.58	391.76
Race												
White	2.48	1.94	2.63	0.70	0.97	0.64	6217.85	1398.84	5220.95	429.41	101.98	356.64
Black	2.10	1.71	2.15	0.59	0.48	0.84	4627.51	1175.53	3948.91	300.48	94.26	244.75
Asian/Pac	2.04	1.80	1.98	1.53	2.58	0.74	4792.69	1159.89	3949.05	396.90	97.99	325.62
Other	2.68	1.89	2.77	0.20	0.72	0.12	5745.16	1286.36	5221.44	446.96	105.33	403.05
Origin												
Hispanic	2.75	2.02	2.83	0.59	0.79	0.53	5507.81	1392.47	4731.39	420.96	115.98	356.19
Nonhisp	2.43	1.91	2.57	0.69	0.93	0.66	6035.28	1371.94	5083.92	415.32	100.89	345.16
Sex												
Male	2.37	1.82	2.52	0.95	1.22	0.92	6401.72	1406.07	5381.56	429.40	102.06	355.13
Female	2.51	2.00	2.63	0.45	0.63	0.40	5672.02	1338.84	4793.16	402.88	100.47	336.77
Employment												
Employed	2.36	1.87	2.53	0.85	0.91	0.84	5964.36	1388.90	4874.53	415.06	100.93	335.72
Not emp	2.58	2.04	2.66	0.39	0.96	0.31	6115.01	1329.10	5420.94	416.25	102.14	362.66
Food Stamp												
Receiving	2.19	1.66	2.25	0.36	1.03	0.29	4623.75	1360.21	4032.92	279.04	106.20	232.63
Not	2.46	1.92	2.59	0.70	0.92	0.67	6096.96	1372.86	5131.31	423.12	101.10	351.83
Special Diet												
Yes	2.99	2.23	3.15	0.51	0.99	0.38	6804.95	1473.67	5865.42	521.48	125.17	441.53
No	2.36	1.87	2.49	0.71	0.92	0.69	5901.34	1358.86	4953.85	399.63	98.06	331.07
WEEK												
Weekend	2.33	1.90	2.47	0.89	1.15	0.81	5360.99	1276.45	4389.31	359.09	92.96	288.17
Weekday	2.49	1.92	2.63	0.60	0.82	0.59	6296.87	1418.43	5362.40	439.31	105.24	369.78

Demographic Variables	VIT E-ALPHA (MILLIGRAMS ATE) ALL	FAFH	FAH	VIT C (MILLIGRAMS) ALL	FAFH	FAH	THIAMIN (MILLIGRAMS) ALL	FAFH	FAH	RIBOFLAVIN (MILLIGRAMS) ALL	FAFH	FAH
Urbanization												
Urban	7.44	2.32	5.85	91.85	20.71	77.80	1.25	0.33	1.01	1.61	0.41	1.32
Suburban	8.12	2.53	6.28	93.74	20.88	78.63	1.34	0.37	1.07	1.69	0.44	1.36
Non-Metro	7.51	2.38	5.98	78.68	19.36	66.49	1.35	0.36	1.12	1.72	0.43	1.44
Region												
Northeast	7.65	2.21	6.14	98.64	22.89	83.11	1.29	0.35	1.05	1.61	0.43	1.31
Midwest	7.74	2.35	6.04	84.92	18.55	71.62	1.33	0.35	1.07	1.70	0.44	1.38
South	7.96	2.67	6.10	85.01	18.86	72.16	1.37	0.38	1.11	1.68	0.44	1.38
West	7.89	2.46	6.19	92.85	23.07	77.10	1.27	0.34	1.03	1.72	0.42	1.43
Race												
White	8.02	2.48	6.24	88.32	19.76	74.23	1.33	0.36	1.07	1.71	0.44	1.40
Black	6.31	2.24	4.97	96.60	28.16	80.07	1.25	0.39	1.01	1.45	0.41	1.21
Asian/Pac	7.76	1.86	6.40	93.51	14.66	82.84	1.37	0.24	1.19	1.38	0.34	1.12
Other	7.73	2.47	6.57	95.22	16.44	89.48	1.31	0.31	1.17	1.61	0.40	1.44
Origin												
Hispanic	8.00	2.06	6.85	97.00	20.32	85.71	1.35	0.30	1.18	1.60	0.37	1.39
Nonhisp	7.82	2.46	6.09	89.22	20.48	75.01	1.32	0.36	1.07	1.68	0.44	1.37
Sex												
Male	9.11	2.81	7.04	97.83	23.38	80.81	1.55	0.43	1.23	1.94	0.52	1.56
Female	6.66	2.09	5.27	81.88	17.57	70.39	1.12	0.29	0.93	1.44	0.35	1.20
Employment												
Employed	8.14	2.67	6.02	89.29	21.90	72.06	1.35	0.39	1.04	1.69	0.46	1.32
Not emp	7.27	1.88	6.28	89.78	16.72	81.10	1.28	0.29	1.13	1.65	0.36	1.46
Food Stamp												
Receiving	6.18	1.66	5.46	70.89	18.27	62.98	1.19	0.30	1.06	1.47	0.36	1.31
Not	7.92	2.48	6.15	90.50	20.55	76.04	1.33	0.36	1.07	1.69	0.44	1.38
Special Diet												
Yes	7.56	2.10	6.21	103.72	17.34	92.73	1.21	0.26	1.04	1.53	0.32	1.33
No	7.86	2.50	6.10	87.33	20.90	72.73	1.34	0.37	1.08	1.70	0.45	1.38
WEEK												
Weekend	7.96	2.37	6.14	87.03	21.02	71.02	1.35	0.36	1.06	1.72	0.44	1.38
Weekday	7.76	2.49	6.10	90.49	20.21	77.18	1.31	0.36	1.07	1.66	0.43	1.37

Demographic Variables	NIACIN ALL	NIACIN FAFH	NIACIN FAH	VIT B6 ALL	VIT B6 FAFH	VIT B6 FAH	FOLATE ALL	FOLATE FAFH	FOLATE FAH	VIT B12 ALL	VIT B12 FAFH	VIT B12 FAH
	(MILLIGRAMS)			(MILLIGRAMS)			(MICROGRAMS)			(MICROGRAMS)		
Urbanization												
Urban	18.44	5.61	14.61	1.45	0.39	1.19	217.19	55.36	179.49	5.48	1.51	4.45
Suburban	19.51	6.02	15.12	1.54	0.40	1.25	227.51	55.59	187.19	5.60	1.83	4.26
Non-Metro	18.82	5.55	15.28	1.44	0.38	1.20	215.16	51.91	182.54	5.21	1.48	4.26
Region												
Northeast	18.89	5.65	15.02	1.48	0.36	1.23	217.28	53.74	180.76	6.34	2.32	4.75
Midwest	18.89	5.81	14.72	1.49	0.39	1.20	209.40	51.17	172.68	5.31	1.58	4.17
South	19.68	6.13	15.44	1.51	0.41	1.23	234.36	57.19	195.18	5.32	1.54	4.25
West	18.63	5.49	14.85	1.49	0.38	1.23	222.21	55.56	184.27	5.02	1.39	4.06
Race												
White	19.26	5.80	15.09	1.52	0.39	1.24	224.96	54.35	186.16	5.58	1.75	4.32
Black	18.01	6.12	14.36	1.30	0.40	1.06	198.61	58.64	164.15	5.08	1.20	4.39
Asian/Pac	18.02	4.85	14.49	1.34	0.36	1.08	188.72	45.44	155.67	3.30	1.00	2.57
Other	19.23	5.39	16.82	1.52	0.37	1.36	238.86	51.93	218.02	4.40	1.23	3.84
Origin												
Hispanic	20.23	5.41	17.21	1.58	0.36	1.37	247.49	48.78	220.44	4.78	1.30	4.05
Nonhisp	19.07	5.83	14.98	1.49	0.39	1.22	221.37	54.79	183.23	5.50	1.69	4.31
Sex												
Male	22.50	7.03	17.34	1.76	0.47	1.41	254.31	63.34	208.14	6.50	2.07	4.98
Female	16.03	4.61	12.98	1.26	0.31	1.05	193.03	45.96	162.85	4.55	1.29	3.69
Employment												
Employed	19.81	6.29	14.81	1.52	0.42	1.19	222.98	58.99	176.46	5.58	1.80	4.15
Not emp	17.88	4.57	15.48	1.45	0.32	1.28	220.75	43.21	198.28	5.29	1.37	4.56
Food Stamp												
Receiving	17.43	4.85	15.33	1.27	0.33	1.12	189.52	43.37	170.82	5.28	1.36	4.69
Not	19.20	5.85	15.04	1.51	0.39	1.23	223.99	55.03	185.15	5.48	1.69	4.28
Special Diet												
Yes	17.76	4.58	14.83	1.46	0.31	1.26	226.36	42.93	199.05	4.33	1.09	3.63
No	19.31	5.99	15.09	1.50	0.40	1.22	221.54	56.22	182.18	5.65	1.76	4.40
WEEK												
Weekend	19.42	5.98	14.83	1.51	0.40	1.20	221.99	56.09	179.22	5.43	1.93	3.94
Weekday	18.98	5.74	15.15	1.49	0.39	1.23	222.25	53.96	186.58	5.49	1.56	4.45

Demographic Variables	CALCIUM ALL	CALCIUM FAFH	CALCIUM FAH	PHOSPHORUS ALL	PHOSPHORUS FAFH	PHOSPHORUS FAH	MAGNESIUM ALL	MAGNESIUM FAFH	MAGNESIUM FAH	IRON ALL	IRON FAFH	IRON FAH
	(MILLIGRAMS)			(MILLIGRAMS)			(MILLIGRAMS)			(MILLIGRAMS)		
Urbanization												
Urban	665.42	183.24	540.41	1068.27	319.61	849.80	227.00	64.89	182.69	11.84	3.29	9.59
Suburban	714.34	203.94	565.94	1127.69	342.42	878.24	239.51	66.26	191.33	12.61	3.57	10.01
Non-Metro	713.71	197.15	588.49	1115.77	330.76	904.66	228.22	62.61	188.48	12.22	3.31	10.12
Region												
Northeast	677.21	200.21	540.39	1072.97	326.29	849.81	228.24	61.27	186.49	12.22	3.50	9.73
Midwest	724.50	204.86	577.33	1105.95	337.87	863.08	229.64	64.99	182.95	11.90	3.30	9.52
South	669.39	195.55	534.40	1119.78	349.58	877.86	233.73	66.86	187.61	12.89	3.58	10.42
West	766.18	191.77	635.23	1148.70	315.56	932.03	245.85	66.19	200.46	12.20	3.35	9.90
Race												
White	728.88	201.59	584.59	1129.85	337.27	888.09	239.59	65.36	192.82	12.50	3.46	10.02
Black	533.69	172.58	431.36	974.50	324.67	781.06	189.75	63.36	152.06	11.10	3.50	9.03
Asian/Pac	553.72	164.77	433.88	994.92	257.45	807.67	214.10	56.58	172.94	11.39	2.71	9.42
Other	652.97	185.21	569.97	1147.25	316.96	1006.51	242.14	65.28	213.40	12.78	2.98	11.55
Origin												
Hispanic	620.39	152.34	535.49	1171.33	282.33	1014.05	251.01	56.19	219.75	13.22	2.91	11.60
Nonhisp	706.64	199.22	567.38	1110.34	336.26	874.75	233.45	65.32	187.80	12.32	3.46	9.89
Sex												
Male	811.38	237.63	637.28	1299.39	403.92	1002.95	269.34	77.43	212.64	14.42	4.11	11.41
Female	606.60	158.55	502.09	942.55	266.01	766.72	201.94	52.76	167.17	10.47	2.79	8.63
Employment												
Employed	722.13	212.49	553.98	1149.55	361.45	862.94	239.91	69.95	184.57	12.52	3.70	9.58
Not emp	672.05	160.10	588.14	1046.60	265.11	907.35	223.58	52.29	196.19	12.04	2.77	10.59
Food Stamp												
Receiving	558.85	156.33	491.03	963.92	275.33	844.41	194.56	49.63	173.08	10.83	2.91	9.56
Not	712.08	199.50	570.61	1120.51	336.97	881.01	236.20	65.62	189.67	12.43	3.47	9.97
Special Diet												
Yes	631.52	129.89	548.79	1001.10	241.26	846.99	230.81	50.99	198.29	11.42	2.62	9.74
No	714.82	207.22	569.03	1128.86	347.51	883.89	234.47	66.98	187.37	12.48	3.56	9.98
WEEK												
Weekend	735.37	199.87	582.73	1145.90	342.05	884.14	236.54	65.93	186.16	12.62	3.59	9.86
Weekday	690.71	197.21	559.47	1098.00	331.53	876.92	232.92	64.69	189.91	12.23	3.38	9.98

Demographic	ZINC			COPPER			SODIUM			POTASSIUM		
Variables	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
		(MILLIGRAMS)			(MILLIGRAMS)			(MILLIGRAMS)			(MILLIGRAMS)	
Urbanization												
Urban	9.99	3.16	7.82	1.05	0.32	0.83	2810.98	940.14	2166.82	2273.52	679.96	1808.72
Suburban	10.27	3.26	7.89	1.08	0.33	0.84	3006.59	1010.47	2269.20	2447.27	703.70	1935.17
Non-Metro	10.34	3.18	8.30	1.02	0.29	0.83	3038.68	1011.72	2388.16	2380.57	695.88	1936.85
Region												
Northeast	9.73	3.06	7.63	1.06	0.31	0.84	2858.37	943.39	2211.83	2404.36	685.32	1936.52
Midwest	10.08	3.22	7.77	1.03	0.31	0.80	3043.36	1038.36	2296.38	2401.71	710.17	1891.34
South	10.68	3.50	8.25	1.08	0.33	0.85	3058.45	1033.62	2341.16	2360.32	704.61	1873.52
West	10.16	2.91	8.16	1.05	0.31	0.83	2868.69	937.00	2219.63	2430.07	679.85	1962.84
Race												
White	10.27	3.21	7.97	1.07	0.32	0.83	2991.57	1005.91	2269.13	2451.64	702.24	1948.66
Black	9.78	3.45	7.71	0.97	0.32	0.78	2813.24	965.89	2237.26	1948.32	668.01	1550.02
Asian/Pac	8.92	2.49	7.11	0.98	0.26	0.79	3003.32	752.57	2455.95	2010.22	485.53	1657.08
Other	11.02	2.81	9.81	1.07	0.27	0.96	3062.98	850.57	2684.59	2483.91	694.24	2174.36
Origin												
Hispanic	11.28	2.63	9.81	1.12	0.23	0.99	3150.03	771.75	2719.97	2525.39	610.62	2185.21
Nonhisp	10.20	3.23	7.92	1.05	0.32	0.83	2968.46	1002.12	2264.15	2389.64	699.14	1900.36
Sex												
Male	12.20	3.93	9.31	1.21	0.37	0.94	3619.38	1179.54	2752.66	2750.16	831.80	2140.19
Female	8.44	2.51	6.77	0.92	0.27	0.73	2389.08	813.53	1848.11	2070.81	562.24	1699.69
Employment												
Employed	10.53	3.43	7.80	1.08	0.34	0.81	3106.72	1071.93	2254.51	2442.20	743.89	1852.91
Not emp	9.71	2.67	8.30	1.01	0.26	0.88	2740.87	797.71	2319.99	2308.79	573.38	2007.84
Food Stamp												
Receiving	9.28	3.01	7.97	0.97	0.25	0.86	2679.19	841.15	2313.22	1985.55	536.46	1753.06
Not	10.28	3.23	7.98	1.06	0.32	0.83	2990.55	1001.76	2276.33	2416.65	702.44	1917.94
Special Diet												
Yes	9.09	2.49	7.50	1.00	0.24	0.85	2475.89	747.77	1996.66	2378.50	563.14	2018.91
No	10.40	3.32	8.05	1.06	0.33	0.83	3048.64	1029.82	2320.63	2396.13	714.92	1892.69
WEEK												
Weekend	10.52	3.31	7.98	1.06	0.33	0.80	3021.36	1001.96	2253.00	2387.42	698.29	1853.26
Weekday	10.11	3.18	7.98	1.05	0.31	0.85	2954.10	993.82	2288.99	2396.54	696.33	1932.86

APPENDIX B

Means of Nutrient Intakes as a Percentage of the RDA

Table B.1. Means of nutrient intakes as a percentage of the RDA - by race.

Nutrient	White	Black	Asian/Pac[a]	Others
Food Energy				
ALL	73.38	69.32	70.09	72.65
FAFH	24.09	24.57	19.14	22.58
FAH	56.08	54.62	56.16	62.23
Protein				
ALL	128.99	127.41	130.29	140.07
FAFH	41.3	42.78	31.88	37.76
FAH	99.35	101.94	107.1	123.44
Vitamin A				
ALL	139.19	105.07	109.46	127.23
FAFH	31.26	26.49	26.01	29.64
FAH	116.92	89.79	90.54	114.93
Vitamin E				
ALL	88.69	70.88	88.39	83.99
FAFH	27.38	25.21	20.89	26.96
FAH	69.05	55.81	73.19	71.43
Vitamin C				
ALL	146.61	160.49	155.85	156.86
FAFH	32.86	46.89	24.44	27.33
FAH	123.19	132.97	138.08	147.25
Thiamin				
ALL	108.36	101.76	109.18	101.33
FAFH	28.47	31.67	19.64	24.44
FAH	87.99	83.05	94.89	91.04
Riboflavin				
ALL	119.08	101.65	95.1	107.75
FAFH	29.98	28.43	23.26	26.78
FAH	97.66	85.04	78.17	96.32
Niacin				
ALL	119.91	112.18	108.19	114.23
FAFH	35.18	37.16	28.05	31.47
FAH	94.70	90.09	87.79	100.27

Table B.1 Cont.

Nutrient		White	Black	Asian/Pac[a]	Others
Vitamin B6					
	ALL	84.33	73.52	74.98	82.97
	FAFH	21.61	22.40	19.78	20.97
	FAH	68.88	60.32	60.59	73.97
Folate					
	ALL	117.01	104.21	99.08	119.29
	FAFH	28.25	30.68	23.66	26.90
	FAH	96.84	86.18	81.86	108.29
Vitamin B12					
	ALL	278.6	253.85	165.36	218.31
	FAFH	87.72	60.05	50.03	61.78
	FAH	215.66	219.50	128.97	190.65
Calcium					
	ALL	83.87	60.04	62.22	67.55
	FAFH	22.43	18.95	18.31	17.93
	FAH	67.81	48.82	48.89	59.70
Phosphorus					
	ALL	130.93	110.82	113.76	121.63
	FAFH	37.98	36.18	28.81	31.60
	FAH	103.72	89.35	92.81	107.91
Magnesium					
	ALL	75.31	60.24	68.76	74.96
	FAFH	20.31	19.99	17.72	20.08
	FAH	60.78	48.36	55.87	66.14
Iron					
	ALL	108.93	93.8	91.66	105.19
	FAFH	30.05	29.17	21.27	24.64
	FAH	87.42	76.56	76.19	94.95
Zinc					
	ALL	75.45	72.92	67.37	79.81
	FAFH	23.42	25.55	18.99	20.52
	FAH	58.65	57.66	53.55	70.94

[a]Refers to Asians and Pacific Islanders.

Table B.2. Nutrient intakes as a percentage of RDA - sex and age group means (weighted).

Sex/Age	FOOD ENERGY			PROTEIN			VITAMIN A			VITAMIN E		
Variables	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
Males												
15-18	77.42	28.56	53.76	152.02	52.36	108.64	121.59	28.27	98.17	97.38	25.15	76.54
19-24	78.80	34.63	49.91	150.59	62.36	98.85	96.27	24.38	77.24	90.87	34.03	62.91
25-50	72.71	24.33	53.79	137.59	43.25	104.00	125.57	26.74	104.92	90.27	29.08	67.68
51+	82.25	23.43	68.08	126.12	35.74	104.50	147.85	33.49	127.67	91.13	23.52	76.93
Females												
15-18	75.35	26.17	54.62	139.68	45.20	103.98	116.97	29.75	93.70	76.03	23.88	57.19
19-24	67.18	26.39	47.17	127.15	48.72	90.31	109.57	24.63	92.47	75.41	27.25	54.95
25-50	66.70	21.42	51.40	119.98	36.01	94.29	138.36	35.22	113.31	84.13	27.41	64.56
51+	73.65	20.85	62.38	120.51	34.00	102.15	164.33	36.99	144.42	86.02	25.14	72.44
Pregnant*	64.23	13.85	54.72	108.54	19.42	95.21	120.83	18.73	107.98	67.30	13.50	58.03
Lactating*	64.92	17.01	56.06	115.05	28.16	100.37	110.50	34.33	92.61	62.58	14.88	54.83

*Note: The following are used by NFCS for calculating values: for pregnant women, the third trimester; for lactating women, the first 6 months.

Table B.2 Cont.

Sex/Age	VITAMIN C			THIAMIN			RIBOFLAVIN			NIACIN		
Variables	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
Males												
15-18	184.69	42.55	149.43	122.36	33.90	94.27	134.65	37.64	103.46	118.98	36.20	88.98
19-24	152.70	52.51	109.97	107.89	39.28	75.72	120.42	40.74	87.33	121.48	48.12	81.73
25-50	158.24	39.03	128.03	101.18	28.04	79.43	110.98	29.04	88.48	119.88	37.18	91.00
51+	170.34	29.06	152.93	127.53	30.06	109.40	135.12	30.21	116.92	142.94	37.15	120.50
Females												
15-18	140.06	30.10	116.72	112.66	30.59	88.66	130.10	35.92	101.91	100.78	30.19	77.00
19-24	122.98	33.65	98.72	96.25	31.65	72.77	104.59	31.54	81.49	100.44	37.08	72.52
25-50	127.71	30.12	106.32	98.18	26.23	79.51	106.01	26.96	86.83	107.24	30.92	85.19
51+	151.89	26.32	137.79	115.35	24.73	102.04	122.14	25.62	108.36	126.30	32.80	108.61
Pregnant*	116.70	15.88	105.79	85.38	14.11	75.70	107.85	14.91	97.61	96.31	17.63	84.20
Lactating*	109.41	17.48	100.30	81.75	19.30	71.70	104.12	20.21	93.59	91.86	21.58	80.61

*Note: The following are used by NFCS for calculating values: for pregnant women, the the third trimester; for lactating women, the first 6 months.

Table B.2 Cont.

Sex/Age Variables	VITAMIN B6 ALL	VITAMIN B6 FAFH	VITAMIN B6 FAH	FOLATE ALL	FOLATE FAFH	FOLATE FAH	VITAMIN B12 ALL	VITAMIN B12 FAFH	VITAMIN B12 FAH	CALCIUM ALL	CALCIUM FAFH	CALCIUM FAH
Males												
15-18	98.41	24.04	78.50	150.43	36.23	120.41	331.85	93.28	254.57	92.06	31.53	65.94
19-24	92.59	30.78	67.63	126.94	42.02	92.90	381.33	196.78	215.06	76.25	28.65	52.70
25-50	85.96	23.60	67.66	123.30	31.20	99.14	309.17	82.50	245.22	98.81	27.33	77.62
51+	86.98	19.97	74.94	127.91	24.61	113.12	326.49	95.59	268.67	90.79	20.47	78.45
Females												
15-18	82.29	21.36	65.57	107.79	28.71	85.29	198.11	58.60	151.98	67.74	21.13	51.07
19-24	69.52	22.69	52.71	91.35	27.17	71.49	201.01	66.74	151.45	49.89	15.48	38.50
25-50	76.85	19.43	63.03	102.86	26.38	84.09	228.69	66.86	181.02	72.48	19.64	58.50
51+	84.66	18.32	74.80	117.32	22.77	105.09	240.99	65.94	205.39	72.36	14.94	64.32
Pregnant*	65.60	10.64	58.29	53.17	8.24	47.51	201.50	26.11	183.58	65.48	9.29	59.10
Lactating*	67.83	15.20	59.91	85.72	16.15	77.31	213.39	55.14	184.66	70.98	15.36	62.98

*Note: The following are used by NFCS for calculating values: for pregnant women, the third trimester; for lactating women, the first 6 months.

Table B.2 Cont.

Sex/Age	PHOSPHORUS			MAGNESIUM			IRON			ZINC		
Variables	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
Males												
15-18	127.37	43.25	91.54	69.74	21.10	52.26	144.11	38.64	112.09	87.95	28.89	64.02
19-24	116.54	46.21	78.36	74.49	28.29	51.21	148.95	57.67	101.42	84.60	34.26	56.24
25-50	162.61	48.41	125.03	77.26	21.93	60.25	140.92	39.59	110.22	81.64	25.47	61.85
51+	149.25	38.24	126.16	76.78	17.97	65.94	140.39	32.43	120.84	77.81	21.88	64.58
Females												
15-18	89.90	28.04	67.78	63.33	18.55	48.72	67.76	19.93	52.06	72.31	23.87	53.44
19-24	76.75	26.31	57.12	61.90	20.98	46.28	65.95	22.80	48.93	66.81	25.02	47.94
25-50	115.66	33.25	91.97	71.67	19.29	57.94	56.72	15.52	45.67	69.36	20.47	54.76
51+	115.47	28.01	100.37	76.98	17.24	67.70	109.83	24.86	96.44	71.90	19.64	61.30
Pregnant*	90.93	15.93	79.99	62.93	10.50	55.72	37.86	6.06	33.70	60.69	10.43	53.53
Lactating*	100.31	22.23	88.72	52.68	11.52	46.67	84.12	18.46	74.50	50.28	13.09	43.46

*Note: The following are used by NFCS for calculating values: for pregnant women, the third trimester; for lactating women, the first 6 months.

Table B.3. Means of nutrient intakes as a percentage of RDA - for selected population groups.

Variable	FOOD ENERGY			PROTEIN			VITAMIN A			VITAMIN E		
	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
Urbanization												
Central City	70.25	23.68	54.03	125.94	39.51	98.91	145.14	32.75	122.91	83.22	26.03	65.40
Suburban	73.47	24.23	55.79	130.02	42.02	99.37	136.29	30.44	114.26	89.44	27.78	69.20
Non-metro	73.80	24.00	58.39	129.89	41.12	103.54	123.68	29.61	105.08	83.46	26.46	66.49
Region												
Northeast	71.31	22.90	55.62	126.45	40.52	98.71	142.56	35.02	118.77	84.84	24.39	68.19
Midwest	72.53	24.27	55.07	127.39	41.51	97.54	137.16	29.77	115.83	86.28	26.17	67.48
South	74.72	25.35	57.12	132.89	43.83	102.50	124.30	28.61	104.75	87.62	29.42	67.21
West	71.88	22.84	56.08	127.72	37.55	101.84	141.96	30.96	121.00	87.12	27.14	68.36
Employment Status												
Employed	73.27	25.47	53.01	131.41	43.84	96.58	131.52	30.81	107.33	88.72	29.22	65.52
Not Employed	72.21	20.35	61.48	125.14	34.57	106.93	140.80	30.44	124.91	82.87	21.52	71.56
Food Stamp												
Recipient	67.29	20.66	58.31	126.25	37.67	109.88	107.19	30.75	93.84	70.36	18.93	62.16
Non-recipient	73.20	24.18	55.97	129.29	41.41	99.81	136.43	30.71	114.83	87.51	27.38	68.03
Special Diet												
Yes	66.49	18.29	54.78	119.32	32.42	98.57	155.84	33.38	134.57	85.30	23.65	70.16
No	73.84	24.84	56.28	130.61	42.48	100.61	131.75	30.35	110.58	86.80	27.56	67.35

Table B.3 Cont.

Variable	VITAMIN C			THIAMIN			RIBOFLAVIN			NIACIN		
	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
Urbanization												
Central City	152.32	34.48	128.92	102.29	27.02	83.87	113.11	28.64	93.61	116.02	34.59	92.38
Suburban	155.51	34.69	130.40	107.76	29.13	86.59	116.11	29.91	94.40	119.97	35.93	93.81
Non-metro	130.88	32.26	110.58	110.97	28.84	92.73	120.66	30.11	101.69	118.67	34.21	96.88
Region												
Northeast	163.33	38.02	137.54	105.46	28.12	86.30	112.46	29.40	92.44	118.37	34.27	94.97
Midwest	141.23	30.89	119.09	108.57	28.25	88.28	118.66	30.18	97.00	118.12	35.41	92.67
South	141.21	31.39	119.80	110.98	30.42	90.04	116.79	30.38	95.92	121.78	37.12	96.11
West	154.00	38.33	127.84	102.18	26.61	83.96	118.46	28.26	99.22	115.09	32.86	92.49
Employment Status												
Employed	148.48	36.45	119.81	105.39	30.09	81.61	114.18	31.12	89.62	118.85	37.31	89.26
Not Employed	148.52	27.74	134.13	111.06	24.79	98.09	121.02	25.95	107.48	118.76	29.78	103.12
Food Stamp												
Recipient	117.67	30.39	104.52	100.66	24.88	89.91	106.21	25.93	95.00	111.93	30.25	98.82
Non-recipient	150.22	34.18	126.16	107.82	28.76	87.47	117.25	29.83	96.17	119.20	35.41	94.04
Special Diet												
Yes	172.16	28.77	153.92	105.89	22.68	91.43	113.73	22.89	99.16	119.43	29.81	100.39
No	144.95	34.76	120.67	107.68	29.43	87.02	117.10	30.61	95.64	118.72	35.97	93.38

Table B.3 Cont.

Variable	VITAMIN B6			FOLATE			VITAMIN B12			CALCIUM		
	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
Urbanization												
Central City	81.41	21.51	66.75	113.23	28.96	93.51	273.36	75.86	221.59	77.46	21.14	63.04
Suburban	85.04	21.90	69.13	117.86	28.79	96.98	279.62	91.56	212.83	81.04	22.36	64.78
Non-metro	80.21	21.25	66.75	112.56	27.16	95.49	260.25	74.09	213.10	82.34	21.73	68.59
Region												
Northeast	82.37	20.10	68.71	112.75	27.90	93.79	316.42	116.02	236.71	77.43	21.85	62.52
Midwest	82.93	21.97	67.15	109.39	26.71	90.23	265.15	78.96	208.41	83.73	23.08	67.16
South	83.79	22.72	68.16	121.73	29.80	101.32	265.56	77.00	212.42	75.92	21.63	61.00
West	82.58	21.12	68.14	115.42	28.77	95.78	250.75	69.50	203.01	88.24	21.24	73.77
Employment Status												
Employed	82.97	22.91	64.88	115.41	30.57	91.30	278.96	90.07	207.48	83.55	23.89	64.65
Not Employed	83.15	18.38	73.54	115.75	22.79	103.90	263.41	68.44	227.43	75.49	16.86	66.68
Food Stamp												
Recipient	72.95	19.38	64.56	99.66	22.85	89.81	263.51	68.00	234.08	62.33	16.21	55.31
Non-recipient	83.60	21.74	68.22	116.42	28.62	96.22	273.87	84.66	213.64	81.65	22.16	65.96
Special Diet												
Yes	82.95	17.52	71.79	119.17	22.42	104.92	215.87	54.52	181.02	76.31	15.58	66.38
No	83.05	22.22	67.46	114.99	29.23	94.52	281.92	88.08	219.80	81.28	22.81	65.24

Table B.3 Cont.

Variable	PHOSPHORUS			MAGNESIUM			IRON			ZINC		
	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
Urbanization												
Central City	125.02	37.17	99.61	72.09	20.46	58.13	101.11	28.12	81.92	74.01	23.30	58.07
Suburban	129.02	38.04	101.32	74.98	20.47	60.11	108.83	30.96	86.29	75.21	23.65	57.97
Non-metro	129.59	36.92	106.09	71.93	19.59	59.51	108.11	28.46	90.09	76.27	23.44	61.27
Region												
Northeast	123.91	36.17	99.20	72.06	19.06	59.08	105.47	30.68	84.51	71.66	22.22	56.46
Midwest	128.97	38.62	101.21	72.59	20.27	58.03	102.20	28.35	81.84	74.62	23.67	57.60
South	127.73	39.12	100.68	73.30	20.85	58.92	111.74	30.83	90.51	78.46	25.63	60.69
West	133.28	35.21	109.15	76.95	20.45	62.93	106.57	28.82	86.79	74.28	21.15	59.73
Employment Status												
Employed	133.83	41.02	101.32	74.42	21.63	57.32	108.68	32.16	83.23	76.14	24.79	56.46
Not Employed	118.67	28.56	103.70	72.13	16.63	63.43	104.12	23.49	91.83	73.63	20.20	62.99
Food Stamp												
Recipient	108.67	29.48	95.89	63.21	15.98	56.30	90.09	23.59	79.88	70.77	22.91	60.79
Non-recipient	129.43	37.87	102.54	74.17	20.40	59.72	107.98	29.98	86.72	75.48	23.55	58.73
Special Diet												
Yes	121.38	29.16	102.75	74.64	16.35	64.22	103.17	23.23	88.35	68.49	18.57	56.61
No	129.38	38.72	102.10	73.44	20.77	58.83	107.61	30.65	86.05	76.24	24.19	59.17

APPENDIX C

Parameter Estimates of the Nutrient Demand Models

Variable	FOOD ENERGY ALL	FAFH	FAH	PROTEIN ALL	FAFH	FAH	FAT ALL	FAFH	FAH
	(KILOCALORIES)			(GRAMS/1000 KILOCALORIES)			(GRAMS/1000 KILOCALORIES)		
Intercept	869.750*	965.389*	184.184	13.505*	13.934*	13.643*	13.239*	14.720*	13.268*
	(179.410)	(161.272)	(191.800)	(0.963)	(2.156)	(1.154)	(0.757)	(1.725)	(0.915)
Weight	0.790*	0.914*	0.125	0.005*	0.003	0.006*	0.001	0.003	0.001
	(0.260)	(0.234)	(0.271)	(0.001)	(0.003)	(0.002)	(0.001)	(0.002)	(0.001)
Height	14.680*	-0.138	13.529*	-0.044*	-0.051	-0.045*	-0.007	-0.015	-0.014
	(2.760)	(2.500)	(2.973)	(0.014)	(0.033)	(0.017)	(0.011)	(0.027)	(0.014)
Urban1	-36.850*	-8.006	-43.424*	0.186*	-0.201	0.288*	-0.568*	-0.871*	-0.564*
	(21.150)	(18.698)	(22.041)	(0.113)	(0.248)	(0.138)	(0.091)	(0.202)	(0.109)
Urban2	-21.020	14.322	-13.468	0.024	0.226	0.071	-0.211*	-0.585*	-0.181*
	(17.780)	(15.214)	(18.690)	(0.095)	(0.210)	(0.114)	(0.075)	(0.168)	(0.091)
Region1	-2.050	-18.054	30.773	0.138	0.067	0.072	-0.017	-0.098	0.086
	(20.980)	(18.309)	(21.601)	(0.115)	(0.253)	(0.139)	(0.091)	(0.203)	(0.109)
Region2	-37.530*	-41.442*	-9.455	0.314*	0.522*	0.216*	0.293*	0.388*	0.438*
	(19.590)	(16.547)	(20.362)	(0.104)	(0.223)	(0.125)	(0.081)	(0.180)	(0.098)
Region4	-58.130*	-62.337*	1.526	0.055	-0.111	0.050	-0.042	-0.126	0.027
	(21.140)	(18.313)	(21.947)	(0.115)	(0.251)	(0.140)	(0.092)	(0.208)	(0.112)
Race2	-60.760*	23.583	-22.913	0.411*	0.098	0.328*	-0.171	-0.550*	-0.012
	(27.160)	(24.846)	(28.003)	(0.148)	(0.338)	(0.178)	(0.115)	(0.262)	(0.139)
Race3	-15.860	0.676	24.258	1.062*	0.183	0.640	-1.075*	0.281	-1.118*
	(80.640)	(63.786)	(81.296)	(0.390)	(1.020)	(0.470)	(0.377)	(0.836)	(0.442)
Race4	116.550*	124.149*	102.743*	0.032	-0.775	-0.236	-0.032	-0.321	-0.317
	(55.880)	(61.492)	(57.893)	(0.269)	(0.669)	(0.315)	(0.209)	(0.537)	(0.257)
Hisp1	-49.730	-58.815	27.524	0.899*	0.230	1.168*	-0.312*	-0.276	-0.197
	(46.860)	(48.595)	(47.152)	(0.220)	(0.644)	(0.244)	(0.180)	(0.475)	(0.222)
Sex1	480.770*	154.922*	375.820*	0.042	-0.195	0.154	0.181*	-0.711*	0.404*
	(21.370)	(18.775)	(22.584)	(0.112)	(0.246)	(0.134)	(0.088)	(0.198)	(0.106)
Employ1	-2.230	81.676*	-129.411*	-0.024	-0.248	-0.018	0.183*	-0.069	0.082
	(17.330)	(14.790)	(17.958)	(0.094)	(0.213)	(0.113)	(0.074)	(0.171)	(0.089)
Fstamp1	-26.170	-61.426*	24.397	0.210	-0.036	0.202	-0.048	-1.026*	0.032
	(36.460)	(35.530)	(36.757)	(0.199)	(0.517)	(0.227)	(0.154)	(0.397)	(0.183)
diet1	-146.080*	-79.205*	-88.335*	1.050*	1.031*	1.095*	-0.762*	0.158	-0.802*
	(20.180)	(17.927)	(20.623)	(0.126)	(0.294)	(0.146)	(0.098)	(0.223)	(0.114)
Hsize	-5.660	-38.091*	38.863*	-0.024	-0.244*	0.008	0.041*	-0.069	0.113*
	(5.640)	(4.832)	(5.776)	(0.029)	(0.066)	(0.034)	(0.023)	(0.054)	(0.028)
Age	-13.310*	-22.747*	6.065*	0.098*	0.081*	0.093*	0.036*	-0.005	0.034*
	(2.190)	(1.996)	(2.220)	(0.011)	(0.026)	(0.013)	(0.009)	(0.021)	(0.011)
Agesq	0.090*	0.192*	-0.052*	-0.001*	-0.001*	-0.001*	- a *	a	- a *
	(0.020)	(0.021)	(0.022)	(a)	(a)	(a)	(a)	(a)	(a)
Weekend	38.320*	10.891	-11.049	-0.219*	0.303	-0.386*	0.036	0.140	0.029
	(20.170)	(16.512)	(21.046)	(0.107)	(0.222)	(0.129)	(0.085)	(0.173)	(0.103)
Income	- a	0.001*	-0.003*	a	a *	a	a	a *	- a
	(0.001)	(0.001)	(0.001)	(a)	(a)	(a)	(a)	(a)	(a)
Incomesq	- a	- a *	a *	a	- a *	a	- a	- a *	- a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*									
Adj R-SQ	0.2400	0.1294	0.1322	0.0459	0.0267	0.0313	0.0339	0.0220	0.0323
F-Tests Prob >F									
Urbanization	0.2000	0.6414	0.1346	0.2117	0.1636	0.1012	0.0001	0.0001	0.0001
Region	0.0160	0.0038	0.3355	0.0206	0.0529	0.3692	0.0004	0.0398	0.0001
Race	0.0190	0.1823	0.2559	0.0029	0.6858	0.1223	0.0190	0.1807	0.0519
Regression Type	wls	wls	wls	wls	wls	wls	wls	wls	wls

Note: Numbers rounded to three decimal places.
Numbers which are "a" indicate values less than 0.0005.
Figures in parentheses are standard errors.
Imratio denotes the inverse of Mill's ratio.
wls denotes weighted least squares.
ols denotes ordinary least squares.
Asterisk denotes statistical significance at the 0.05 level.

Variable	SAT. FAT ACIDS ALL	FAFH	FAH	MONO FAT ACIDS ALL	FAFH	FAH	POLY FAT ACIDS ALL	FAFH	FAH
	(GRAMS/1000 KILOCALORIES)			(GRAMS/1000 KILOCALORIES)			(GRAMS/1000 KILOCALORIES)		
Intercept	5.230*	5.286*	5.361*	5.150*	5.629*	5.123*	1.849*	2.460*	2.002*
	(0.348)	(0.742)	(0.413)	(0.317)	(0.680)	(0.386)	(0.273)	(0.633)	(0.310)
Weight	0.001	0.001	a	0.001*	0.002*	0.001	-0.001*	- a	-0.001
	(0.001)	(0.001)	(0.001)	(a)	(0.001)	(0.001)	(a)	(0.001)	(a)
Height	-0.001	0.001	-0.006	-0.007	-0.006	-0.010*	0.003	-0.003	- a
	(0.005)	(0.011)	(0.006)	(0.005)	(0.010)	(0.006)	(0.004)	(0.010)	(0.005)
Urban1	-0.196*	-0.294*	-0.200*	-0.281*	-0.306*	-0.284*	-0.047	-0.150*	-0.044
	(0.041)	(0.086)	(0.050)	(0.037)	(0.080)	(0.045)	(0.033)	(0.076)	(0.036)
Urban2	-0.118*	-0.214*	-0.144*	-0.111*	-0.204*	-0.099*	0.036	-0.131*	0.073*
	(0.035)	(0.072)	(0.042)	(0.031)	(0.066)	(0.038)	(0.027)	(0.065)	(0.031)
Region1	0.215*	0.345*	0.206*	0.139*	0.190*	0.083*	-0.088*	-0.206*	-0.036
	(0.042)	(0.088)	(0.050)	(0.038)	(0.079)	(0.046)	(0.033)	(0.075)	(0.037)
Region2	0.251*	0.343*	0.274*	0.055	0.110	0.106*	-0.031	-0.127*	0.023
	(0.037)	(0.077)	(0.045)	(0.033)	(0.071)	(0.041)	(0.029)	(0.067)	(0.034)
Region4	0.110*	0.096	0.134*	-0.118*	-0.113	-0.091*	-0.004	-0.065	0.015
	(0.042)	(0.087)	(0.051)	(0.039)	(0.081)	(0.047)	(0.034)	(0.077)	(0.038)
Race2	-0.218*	-0.274*	-0.185*	0.091*	-0.123	0.179*	-0.084*	-0.110	-0.069
	(0.052)	(0.110)	(0.062)	(0.048)	(0.106)	(0.058)	(0.040)	(0.092)	(0.045)
Race3	-0.859*	0.117	-0.911*	-0.421*	-0.124	-0.407*	0.297*	0.323	0.304*
	(0.155)	(0.386)	(0.170)	(0.156)	(0.306)	(0.181)	(0.141)	(0.338)	(0.161)
Race4	-0.035	-0.322	-0.100	-0.005	-0.238	-0.071	0.011	0.136	-0.101
	(0.097)	(0.223)	(0.116)	(0.086)	(0.210)	(0.109)	(0.077)	(0.197)	(0.085)
Hisp1	-0.241*	-0.234	-0.176*	-0.008	0.001	0.015	-0.157*	0.027	-0.154*
	(0.082)	(0.197)	(0.101)	(0.074)	(0.186)	(0.093)	(0.063)	(0.175)	(0.071)
Sex1	-0.005	-0.213*	0.068	0.203*	-0.192*	0.290*	-0.042	-0.322*	0.032
	(0.040)	(0.085)	(0.048)	(0.036)	(0.078)	(0.044)	(0.032)	(0.072)	(0.036)
Employ1	0.039	-0.070	0.018	0.075*	-0.022	0.051	0.067*	0.093	0.029
	(0.034)	(0.074)	(0.041)	(0.031)	(0.067)	(0.037)	(0.027)	(0.063)	(0.031)
Fstamp1	-0.061	-0.314*	-0.051	0.075	-0.254	0.112	-0.058	-0.253*	-0.033
	(0.069)	(0.167)	(0.081)	(0.064)	(0.163)	(0.076)	(0.054)	(0.125)	(0.060)
diet1	-0.427*	-0.174*	-0.437*	-0.317*	-0.026	-0.307*	0.014	0.290*	-0.009
	(0.043)	(0.094)	(0.050)	(0.041)	(0.087)	(0.048)	(0.035)	(0.091)	(0.038)
Hsize	0.011	0.016	0.038*	0.037*	-0.007	0.061*	-0.013*	-0.070*	0.005
	(0.010)	(0.023)	(0.012)	(0.010)	(0.021)	(0.011)	(0.008)	(0.019)	(0.009)
Age	-0.012*	-0.025*	-0.011*	0.012*	-0.011	0.014*	0.030*	0.022*	0.027*
	(0.004)	(0.009)	(0.005)	(0.004)	(0.008)	(0.005)	(0.003)	(0.008)	(0.004)
Agesq	a	a *	a	- a *	0.002*	- a *	- a *	- a	- a *
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Weekend	-0.012	0.038	-0.018	0.048	0.067	0.046	-0.007	-0.040	-0.002
	(0.039)	(0.076)	(0.047)	(0.035)	(0.068)	(0.043)	(0.031)	(0.063)	(0.034)
Income	a	a *	a	- a	a *	- a *	a *	a *	- a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Incomesq	- a	- a *	- a *	- a	- a *	- a	- a	- a *	- a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*									
Adj R-SQ	0.0562	0.0200	0.0459	0.0474	0.0157	0.0428	0.0295	0.0464	0.0130
F-Tests Prob >F									
Urbanization	0.0001	0.0012	0.0001	0.0001	0.0003	0.0001	0.0252	0.0761	0.0019
Region	0.0001	0.0001	0.0001	0.0001	0.0019	0.0001	0.0450	0.0390	0.4860
Race	0.0001	0.0434	0.0001	0.0101	0.4580	0.0014	0.0266	0.3956	0.0560
Regression Type	wls	wls	wls	wls	wls	wls	wls	wls	wls

Variable	CHOLESTEROL ALL	(MILLIGRAMS) FAFH	FAH	CARBOHYDRATE ALL	(GRAMS/1000 KILOCALORIES) FAFH	FAH	DIETARY FIBER ALL	(GRAMS/1000 KILOCALORIES) FAFH	FAH
Intercept	81.254*	82.738*	22.690	42.196*	40.639*	43.505*	1.649*	2.723*	1.682*
	(48.360)	(34.796)	(47.864)	(2.333)	(4.975)	(2.844)	(0.292)	(0.507)	(0.360)
Weight	0.347*	0.193*	0.188*	-0.010*	-0.013*	-0.009*	-0.001*	0.001	-0.001*
	(0.069)	(0.050)	(0.068)	(0.003)	(0.007)	(0.004)	(a)	(0.001)	(0.001)
Height	1.879*	0.234	1.609*	0.045	0.035	0.049	0.005	-0.011	0.007
	(0.749)	(0.543)	(0.741)	(0.036)	(0.077)	(0.044)	(0.005)	(0.007)	(0.006)
Urban1	-12.170*	2.817	-17.154*	0.427	0.556	0.829*	0.088*	-0.073	0.101*
	(5.650)	(4.154)	(5.594)	(0.272)	(0.594)	(0.332)	(0.035)	(0.059)	(0.045)
Urban2	-12.237*	-0.448	-11.154*	0.145	0.106	-0.011	0.065*	-0.081	0.084*
	(4.680)	(3.338)	(4.664)	(0.226)	(0.477)	(0.277)	(0.029)	(0.049)	(0.036)
Region1	-0.930	1.802	2.265	-0.414	-0.608	-0.134	-0.089*	-0.151*	-0.086*
	(5.413)	(4.138)	(5.264)	(0.261)	(0.591)	(0.312)	(0.035)	(0.058)	(0.043)
Region2	-15.138*	-4.542	-10.051*	-1.057*	-2.146*	-1.127*	-0.016	-0.031	-0.027
	(5.088)	(3.521)	(5.069)	(0.245)	(0.503)	(0.301)	(0.031)	(0.052)	(0.040)
Region4	-12.003*	-7.136*	-2.264	-0.162	0.117	-0.522	0.074*	0.108*	0.037
	(5.553)	(4.121)	(5.522)	(0.268)	(0.589)	(0.328)	(0.037)	(0.059)	(0.046)
Race2	40.746*	5.097	47.306*	-0.207	2.101*	-0.873*	-0.257*	-0.063	-0.326*
	(7.674)	(5.591)	(7.771)	(0.370)	(0.799)	(0.461)	(0.043)	(0.078)	(0.053)
Race3	35.782*	19.156	39.679*	0.932	0.401	0.797	-0.037	-0.087	-0.119
	(18.254)	(16.309)	(17.917)	(0.881)	(2.332)	(1.064)	(0.158)	(0.228)	(0.182)
Race4	44.774*	21.453	43.304*	0.755	1.313	1.538	0.161*	-0.066	0.209*
	(15.659)	(13.108)	(16.183)	(0.755)	(1.874)	(0.961)	(0.082)	(0.160)	(0.101)
Hisp1	48.265*	-2.561	55.844*	-0.148	0.561	0.083	0.333*	0.067	0.298*
	(12.883)	(11.612)	(13.139)	(0.621)	(1.660)	(0.780)	(0.077)	(0.142)	(0.088)
Sex1	85.227*	20.750*	70.128*	-1.337*	0.873	-1.799*	-0.086*	-0.083	-0.079*
	(5.670)	(4.073)	(5.654)	(0.274)	(0.582)	(0.336)	(0.034)	(0.057)	(0.042)
Employ1	-2.092	12.116*	-23.122*	-0.480*	0.686	-0.226	-0.101*	-0.087*	-0.031
	(4.490)	(3.290)	(4.415)	(0.216)	(0.470)	(0.262)	(0.029)	(0.050)	(0.035)
Fstamp1	2.700	-1.235	6.934	-0.536	1.830	-0.633	-0.096*	-0.062	-0.110
	(9.782)	(7.848)	(9.683)	(0.472)	(1.122)	(0.575)	(0.055)	(0.115)	(0.073)
diet1	-28.951*	-12.127*	-19.457*	1.437*	-1.256*	1.687*	0.413*	0.259*	0.449*
	(5.338)	(3.995)	(5.041)	(0.257)	(0.571)	(0.299)	(0.040)	(0.062)	(0.048)
Hsize	1.877	-6.396*	9.221*	0.098	0.682*	-0.219*	-0.038*	-0.039*	-0.056*
	(1.499)	(1.047)	(1.491)	(0.072)	(0.149)	(0.088)	(0.009)	(0.015)	(0.011)
Age	0.459	-1.831*	2.070*	-0.215*	-0.141*	-0.218*	0.021*	-0.008	0.020*
	(0.563)	(0.439)	(0.561)	(0.027)	(0.062)	(0.033)	(0.004)	(0.006)	(0.005)
Agesq	-0.007	0.016*	-0.017*	0.002*	0.001	0.002*	- a *	a *	- a
	(0.006)	(0.005)	(0.006)	(a)	(0.001)	(a)	(a)	(a)	(a)
Weekend	22.860*	5.609	10.348*	-0.252	-0.777	0.264	-0.080*	0.040	-0.100*
	(5.268)	(3.673)	(5.170)	(0.254)	(0.525)	(0.307)	(0.032)	(0.052)	(0.042)
Income	-0.001*	a	-0.001*	- a	- a *	- a	a *	a *	a *
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Incomesq	a *	- a	a *	a	a	a	- a	- a *	- a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*									
Adj R-SQ	0.1387	0.0495	0.1107	0.0387	0.0352	0.0370	0.1375	0.0205	0.1001
F-Tests Prob >F									
Urbanization	0.0209	0.6825	0.0059	0.2880	0.6184	0.0130	0.0222	0.2390	0.0292
Region	0.0069	0.1482	0.1104	0.0002	0.0001	0.0013	0.0010	0.0015	0.0664
Race	0.0001	0.2047	0.0001	0.4833	0.0631	0.0698	0.0001	0.8252	0.0001
Regression Type	wls	wls	wls	wls	wls	wls	wls	ols	wls

Variable	ALCOHOL			VIT A-IU			CAROTENES		
	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
	(GRAMS/1000 KILOCALORIES)			(INTER. UNITS)			(MICROGRAMS RE)		
Intercept	2.619	3.025	5.561	885.590	269.050	334.658	-37.705	80.167	-73.299
	(2.404)	(9.514)	(3.921)	(1771.7)	(943.165)	(1700.8)	(151.630)	(74.530)	(145.572)
Weight	0.001	-0.013	0.006	-1.059	1.034	-1.083	-0.194	0.136	-0.216
	(0.003)	(0.013)	(0.006)	(2.564)	(1.320)	(2.468)	(0.219)	(0.105)	(0.211)
Height	-0.011	0.035	-0.028	48.499*	27.904*	34.633	3.893*	0.765	2.863
	(0.036)	(0.139)	(0.058)	(27.462)	(14.731)	(26.360)	(2.350)	(1.154)	(2.256)
Urban1	0.804*	2.813*	0.233	475.170*	179.598	389.096*	26.574	4.412	22.102
	(0.276)	(1.045)	(0.454)	(212.000)	(115.764)	(203.649)	(18.144)	(9.116)	(17.429)
Urban2	0.699*	1.369	0.770*	228.940	-132.115	341.503*	21.209	-10.494	30.114*
	(0.250)	(0.987)	(0.404)	(177.571)	(93.333)	(170.551)	(15.197)	(7.292)	(14.596)
Region1	-0.437*	1.739*	-0.979*	656.758*	114.429	749.705*	50.978*	-3.293	57.825*
	(0.263)	(1.027)	(0.416)	(210.463)	(112.926)	(201.859)	(18.012)	(8.857)	(17.276)
Region2	-0.266	1.738*	-1.051*	73.649	-270.525*	261.787	-5.388	-27.517*	11.757
	(0.266)	(1.009)	(0.431)	(192.921)	(99.618)	(185.063)	(16.511)	(7.746)	(15.838)
Region4	-0.274	1.679*	-1.013*	437.205*	-46.725	543.980*	54.241*	-1.155	60.044*
	(0.262)	(1.017)	(0.416)	(214.907)	(113.015)	(206.533)	(18.393)	(9.185)	(17.676)
Race2	0.201	-2.958	0.999	-571.997*	-389.547*	-287.668	-59.504*	-19.998*	-41.246*
	(0.446)	(1856)	(0.683)	(267.118)	(141.432)	(256.735)	(22.861)	(11.186)	(21.972)
Race3	0.108	2.915	-0.732	556.829	425.729	399.769	151.470*	65.659*	128.758*
	(1.261)	(5.276)	(1.909)	(790.672)	(411.208)	(757.116)	(67.671)	(33.123)	(64.798)
Race4	-0.849	2.424	-0.697	979.115*	517.823*	929.043*	108.340*	35.836	99.959*
	(0.881)	(3.028)	(1.598)	(511.856)	(290.052)	(497.688)	(43.808)	(25.034)	(42.594)
Hisp1	-0.526	-0.785	-1.204	-419.029	-69.891	-274.189	-12.330	-1.841	-4.580
	(0.565)	(2.111)	(0.884)	(435.681)	(260.579)	(419.710)	(37.288)	(22.642)	(35.921)
Sex1	0.893*	2.697*	0.724	717.288*	-111.460	717.772*	21.149	-2.678	23.637
	(0.272)	(1.004)	(0.457)	(206.828)	(106.896)	(198.563)	(17.701)	(8.486)	(16.994)
Employ1	-0.175	-2.686*	0.298	-239.349	391.630*	-610.425*	-14.838	23.689*	-38.751*
	(0.240)	(0.892)	(0.393)	(174.706)	(101.189)	(167.631)	(14.952)	(7.228)	(14.346)
Fstamp1	1.499*	2.582	2.021*	-212.036	5.942	-243.918	-65.966*	2.338	-63.392*
	(0.726)	(2.626)	(1.148)	(349.720)	(222.481)	(335.907)	(29.931)	(16.713)	(28.748)
diet1	-0.178	0.616	-0.325	747.774*	42.106	855.180*	92.316*	8.316	92.113*
	(0.283)	(1.037)	(0.470)	(214.151)	(119.599)	(205.623)	(18.328)	(9.201)	(17.598)
Hsize	-0.148*	0.007	-0.210	-199.595*	-83.960*	-76.771	-13.726*	-7.067*	-4.785
	(0.079)	(0.337)	(0.129)	(56.575)	(28.317)	(54.412)	(4.840)	(2.248)	(4.656)
Age	0.012	0.067	-0.007	30.415	-64.986*	61.935*	4.830*	-3.931*	7.016*
	(0.035)	(0.153)	(0.061)	(22.086)	(13.778)	(21.275)	(1.890)	(1.027)	(1.820)
Agesq	-a	-0.001	-a	0.071	0.850*	-0.277	-0.019	0.054*	-0.043*
	(a)	(0.002)	(a)	(0.233)	(0.159)	(0.224)	(0.019)	(0.011)	(0.019)
Weekend	0.093	-0.073	-0.544	-677.648*	76.914	-770.372*	-60.082*	-2.417	-67.841*
	(0.228)	(0.786)	(0.370)	(197.634)	(92.966)	(189.513)	(16.914)	(7.625)	(16.219)
Income	- a	- a *	- a	0.020*	0.008*	0.007	0.002*	0.001*	0.001*
	(a)	(a)	(a)	(0.006)	(0.004)	(0.006)	(0.001)	(a)	(0.001)
Incomesq	a	a	a	- a	- a	- a	- a *	- a	- a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*	0.773*	2.194*	0.149						
	(0.319)	(0.835)	(0.489)						
Adj R-SQ	0.0262	0.0845	0.0303	0.0402	0.0207	0.0383	0.0412	0.0209	0.0377
F-Tests Prob >F									
Urbanization	0.0068	0.0252	0.1074	0.0798	0.0104	0.0781	0.2558	0.1313	0.1150
Region	0.4189	0.2485	0.0310	0.0068	0.0034	0.0014	0.0007	0.0013	0.0004
Race	0.7577	0.2864	0.4604	0.0260	0.0060	0.1537	0.0004	0.0215	0.0039
Regression Type	heckman	heckman	heckman	ols	wls	ols	ols	wls	ols

Variable	VIT E-ALPHA (MILLIGRAMS ATE) ALL	FAFH	FAH	VIT C (MILLIGRAMS) ALL	FAFH	FAH	THIAMIN (MILLIGRAMS) ALL	FAFH	FAH
Intercept	4.039*	2.039*	2.848*	23.796	24.676*	13.712	0.764*	0.626*	0.403*
	(1.695)	(0.853)	(1.690)	(19.352)	(9.504)	(18.901)	(0.176)	(0.111)	(0.180)
Weight	a	0.002*	-0.003	0.027	0.019	0.014	0.001*	0.001*	a
	(0.002)	(0.001)	(0.002)	(0.027)	(0.013)	(0.026)	(a)	(a)	(a)
Height	0.050*	0.016	0.033	0.699*	0.012	0.522*	0.007*	-0.001	0.007*
	(0.026)	(0.013)	(0.025)	(0.299)	(0.146)	(0.292)	(0.003)	(0.002)	(0.003)
Urban1	0.260	-0.026	0.207	4.402*	0.245	4.190*	-0.027	-0.012	-0.022
	(0.195)	(0.099)	(0.197)	(2.249)	(1.092)	(2.187)	(0.020)	(0.013)	(0.021)
Urban2	0.106	-0.069	0.143	6.761*	-0.188	6.534*	-0.016	-0.012	-0.011
	(0.166)	(0.082)	(0.165)	(1.877)	(0.881)	(1.840)	(0.017)	(0.011)	(0.017)
Region1	-0.064	-0.331*	0.272	14.304*	1.095	13.931*	0.004	-0.012	0.025
	(0.198)	(0.096)	(0.198)	(2.331)	(1.124)	(2.276)	(0.020)	(0.013)	(0.021)
Region2	-0.344*	-0.352*	-0.045	1.564	-1.418	2.821	-0.021	-0.038*	0.001
	(0.182)	(0.088)	(0.182)	(2.017)	(0.893)	(1.982)	(0.019)	(0.011)	(0.019)
Region4	-0.030	-0.211*	0.193	5.229*	2.056*	4.381*	-0.095*	-0.042*	-0.055*
	(0.201)	(0.108)	(0.197)	(2.371)	(1.196)	(2.324)	(0.020)	(0.012)	(0.021)
Race2	-1.345*	-0.031	-1.061*	20.679*	7.164*	17.422*	-0.059*	0.031*	-0.048*
	(0.218)	(0.130)	(0.216)	(3.062)	(1.771)	(2.942)	(0.025)	(0.018)	(0.026)
Race3	-0.011	0.474	-0.043	20.342*	3.881	19.042*	0.072	-0.006	0.094
	(0.670)	(0.423)	(0.622)	(9.020)	(4.141)	(8.813)	(0.074)	(0.040)	(0.073)
Race4	0.523	0.519	0.487	30.844*	2.734	30.686*	0.131*	0.053	0.130*
	(0.513)	(0.323)	(0.520)	(6.245)	(3.513)	(6.240)	(0.053)	(0.044)	(0.054)
Hisp1	-0.377	-0.249	-0.037	4.390	-1.188	6.248	-0.022	-0.015	0.019
	(0.425)	(0.286)	(0.424)	(4.973)	(2.838)	(4.879)	(0.043)	(0.033)	(0.044)
Sex1	1.945*	0.304*	1.831*	10.555*	2.856*	9.090*	0.377*	0.100*	0.316*
	(0.192)	(0.098)	(0.197)	(2.257)	(1.089)	(2.209)	(0.020)	(0.012)	(0.021)
Employ1	0.113	0.367*	-0.573*	-8.289*	1.718*	-11.972*	-0.024	0.058*	-0.104*
	(0.157)	(0.080)	(0.159)	(1.887)	(0.889)	(1.844)	(0.017)	(0.010)	(0.017)
Fstamp1	0.060	-0.324*	-0.016	-9.481*	-0.212	-5.860*	-0.020	-0.024	0.005
	(0.278)	(0.166)	(0.312)	(3.417)	(2.178)	(3.374)	(0.035)	(0.025)	(0.036)
diet1	0.004	-0.211*	0.125	15.031*	-0.283	15.292*	-0.047*	-0.048*	-0.010
	(0.196)	(0.101)	(0.194)	(2.423)	(1.098)	(2.385)	(0.020)	(0.012)	(0.021)
Hsize	-0.172*	-0.147*	-0.013	-3.249*	-1.385*	-1.728*	0.002	-0.023*	0.026*
	(0.051)	(0.025)	(0.050)	(0.591)	(0.291)	(0.577)	(0.006)	(0.003)	(0.006)
Age	-0.021	-0.051*	0.033	-0.297	-0.431*	0.212	-0.009*	-0.013*	0.003
	(0.021)	(0.010)	(0.021)	(0.239)	(0.121)	(0.234)	(0.002)	(0.001)	(0.002)
Agesq	a	a *	- a	0.005*	0.004*	0.001	a *	a *	a
	(a)	(a)	(a)	(0.003)	(0.001)	(0.002)	(a)	(a)	(a)
Weekend	0.033	-0.018	-0.197	-8.010*	0.195	-10.028*	0.002	0.008	-0.029
	(0.180)	(0.089)	(0.180)	(2.058)	(0.962)	(1.978)	(0.019)	(0.011)	(0.019)
Income	a *	a *	a	0.001*	a *	a *	a	a *	a *
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Incomesq	- a *	- a	- a *	- a *	- a	- a *	- a	- a *	a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*									
Adj R-SQ	0.0603	0.0474	0.0417	0.0697	0.0228	0.0678	0.1364	0.1016	0.0949
F-Tests Prob >F									
Urbanization	0.4121	0.6887	0.5373	0.0014	0.9105	0.0018	0.3911	0.4680	0.5880
Region	0.2545	0.0004	0.3605	0.0001	0.0166	0.0001	0.0001	0.0010	0.0063
Race	0.0001	0.2759	0.0001	0.0001	0.0007	0.0001	0.0044	0.2374	0.0103
Regression Type	wls	wls	wls	wls	wls	wls	wls	wls	wls

Variable	RIBOFLAVIN ALL	RIBOFLAVIN FAFH	RIBOFLAVIN FAH	NIACIN ALL	NIACIN FAFH	NIACIN FAH	VIT B6 ALL	VIT B6 FAFH	VIT B6 FAH
	(MILLIGRAMS)			(MILLIGRAMS)			(MILLIGRAMS)		
Intercept	1.018*	0.701*	0.643*	8.492*	6.471*	4.228*	0.763*	0.557*	0.478*
	(0.237)	(0.142)	(0.242)	(2.300)	(1.722)	(2.390)	(0.216)	(0.125)	(0.222)
Weight	0.001*	0.001*	a	0.010*	0.009*	0.005	0.001*	0.001*	a
	(a)	(a)	(a)	(0.003)	(0.002)	(0.004)	(a)	(a)	(a)
Height	0.013*	a	0.010*	0.100*	0.013	0.074*	0.009*	- a	0.007*
	(0.004)	(0.002)	(0.004)	(0.035)	(0.026)	(0.037)	(0.003)	(0.002)	(0.003)
Urban1	0.014	0.005	0.006	0.211	-0.067	0.120	0.052*	- a	0.043*
	(0.028)	(0.016)	(0.029)	(0.272)	(0.198)	(0.285)	(0.025)	(0.014)	(0.026)
Urban2	-0.029	-0.008	-0.023	0.158	-0.050	0.125	0.027	-0.014	0.027
	(0.023)	(0.013)	(0.023)	(0.225)	(0.161)	(0.236)	(0.021)	(0.011)	(0.021)
Region1	0.049*	0.003	0.058*	0.253	-0.251	0.591*	0.055*	-0.016	0.082*
	(0.027)	(0.016)	(0.027)	(0.276)	(0.198)	(0.287)	(0.025)	(0.014)	(0.026)
Region2	0.032	-0.018	0.048*	-0.263	-0.208	-0.128	0.013	-0.019	0.021
	(0.025)	(0.014)	(0.025)	(0.247)	(0.176)	(0.258)	(0.023)	(0.012)	(0.023)
Region4	0.011	-0.033*	0.044	-1.250*	-0.693*	-0.632*	-0.031	-0.031*	-0.002
	(0.028)	(0.016)	(0.028)	(0.272)	(0.199)	(0.281)	(0.025)	(0.014)	(0.026)
Race2	-0.168*	-0.007	-0.125*	-0.585*	0.597*	-0.431	-0.110*	0.022	-0.093*
	(0.035)	(0.020)	(0.036)	(0.345)	(0.292)	(0.357)	(0.030)	(0.020)	(0.031)
Race3	0.033*	0.018	-0.277*	0.683	0.245	0.947	0.098	0.033	0.046
	(0.094)	(0.058)	(0.100)	(0.844)	(0.712)	(0.854)	(0.073)	(0.051)	(0.080)
Race4	0.093	0.055	0.089	1.727*	1.301*	1.511*	0.151*	0.101*	0.126*
	(0.069)	(0.058)	(0.071)	(0.676)	(0.638)	(0.721)	(0.061)	(0.046)	(0.064)
Hisp1	-0.134*	0.004	-0.078	-0.733	-0.366	-0.012	-0.055	-0.027	-0.001
	(0.056)	(0.039)	(0.057)	(0.570)	(0.525)	(0.589)	(0.051)	(0.036)	(0.053)
Sex1	0.425*	0.105*	0.363*	5.549*	1.505*	4.563*	0.417*	0.106*	0.355*
	(0.027)	(0.016)	(0.028)	(0.272)	(0.201)	(0.285)	(0.025)	(0.014)	(0.026)
Employ1	-0.060*	0.072*	-0.161*	-0.109	0.837*	-1.396*	-0.039*	0.056*	-0.124*
	(0.022)	(0.013)	(0.023)	(0.221)	(0.160)	(0.229)	(0.020)	(0.011)	(0.021)
Fstamp1	-0.022	-0.010	0.003	0.107	-0.521	0.424	-0.049	-0.004	-0.028
	(0.049)	(0.030)	(0.050)	(0.462)	(0.348)	(0.475)	(0.040)	(0.027)	(0.041)
diet1	-0.043	-0.059*	0.005	-0.404	-0.670*	0.141	0.019	-0.042*	0.057*
	(0.027)	(0.015)	(0.028)	(0.265)	(0.189)	(0.277)	(0.026)	(0.013)	(0.026)
Hsize	-0.011	-0.030*	0.018*	-0.189*	-0.410*	0.239*	-0.026*	-0.035*	0.004
	(0.007)	(0.004)	(0.007)	(0.071)	(0.050)	(0.073)	(0.006)	(0.003)	(0.007)
Age	-0.020*	-0.018*	-0.005	0.024	-0.150*	0.166*	-0.005*	-0.011*	0.004
	(0.002)	(0.002)	(0.003)	(0.028)	(0.021)	(0.028)	(0.003)	(0.002)	(0.003)
Agesq	a *	a *	a *	- a	0.001*	-0.001*	a *	a *	- a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Weekend	0.006	0.002	-0.022	-0.007	0.160	-0.508*	-0.025	0.023*	-0.068*
	(0.025)	(0.014)	(0.026)	(0.257)	(0.175)	(0.268)	(0.023)	(0.012)	(0.024)
Income	- a	a *	- a *	a	a *	- a *	a *	a *	- a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Incomesq	- a	- a *	a *	- a	- a *	a *	- a	- a	a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*									
Adj R-SQ	0.1195	0.0888	0.0821	0.1642	0.0984	0.1040	0.1164	0.0889	0.0839
F-Tests Prob >F									
Urbanization	0.1835	0.6895	0.4653	0.6901	0.9307	0.8542	0.1119	0.3701	0.2220
Region	0.2803	0.1224	0.1118	0.0001	0.0069	0.0018	0.0218	0.1679	0.0098
Race	0.0001	0.7590	0.0001	0.0149	0.0443	0.0615	0.0001	0.1048	0.0033
Regression Type	wls	wls	wls	wls	wls	wls	wls	wls	wls

Variable	FOLATE (MICROGRAMS)			VIT B12 (MICROGRAMS)			CALCIUM (MILLIGRAMS)		
	ALL	FAFH	FAH	ALL	FAFH	FAH	ALL	FAFH	FAH
Intercept	103.110*	60.915*	68.182*	2.707	2.527	1.587	492.220*	319.868*	129.065
	(37.740)	(18.447)	(37.962)	(2.585)	(1.724)	(2.315)	(104.643)	(66.637)	(108.600)
Weight	0.034	0.048*	0.011	0.007*	- a	0.006	0.069	0.192*	-0.116
	(0.054)	(0.025)	(0.055)	(0.004)	(0.002)	(0.004)	(0.152)	(0.091)	(0.151)
Height	1.769*	0.321	1.348*	0.036	0.002	0.006	7.027*	1.332	7.901*
	(0.584)	(0.285)	(0.589)	(0.040)	(0.026)	(0.035)	(1.608)	(1.012)	(1.677)
Urban1	5.760	0.133	3.308	0.216	0.076	0.295	10.611	4.260	11.530
	(4.519)	(2.212)	(4.545)	(0.296)	(0.202)	(0.268)	(12.973)	(7.595)	(12.773)
Urban2	4.080	-2.365	4.696	-0.200	0.009	-0.065	-8.414	-10.910*	-4.400
	(3.646)	(1.784)	(3.691)	(0.246)	(0.168)	(0.226)	(10.761)	(6.300)	(10.605)
Region1	-6.074	-2.903	-3.157	1.195*	0.355*	1.118*	39.800*	9.260	38.266*
	(4.455)	(2.139)	(4.457)	(0.329)	(0.198)	(0.296)	(12.471)	(7.549)	(12.263)
Region2	-19.210*	-6.966*	-14.620*	0.035	-0.085	0.317	47.925*	-10.410	50.045*
	(4.044)	(1.881)	(4.084)	(0.259)	(0.179)	(0.237)	(11.743)	(6.632)	(11.603)
Region4	-15.755*	-2.957	-12.569*	-0.031	-0.018	0.195	76.976*	-15.292*	88.454*
	(4.508)	(2.215)	(4.567)	(0.291)	(0.202)	(0.266)	(13.467)	(7.812)	(13.181)
Race2	-10.651*	2.981	-6.791	0.304	-0.293	0.571	-127.680*	-12.370	-109.782*
	(5.389)	(3.043)	(5.377)	(0.420)	(0.266)	(0.410)	(14.438)	(9.423)	(14.153)
Race3	1.579	9.982	-1.575	-2.333	0.175	-1.266	-125.970*	20.884	-111.744*
	(14.689)	(7.195)	(15.019)	(1.726)	(0.776)	(1.055)	(43.174)	(28.586)	(39.666)
Race4	38.258*	12.937*	34.831*	-1.030	0.021	-1.142	-1.810	26.162	1.983
	(11.445)	(7.214)	(11.667)	(0.800)	(0.545)	(0.769)	(32.751)	(29.720)	(31.289)
Hisp1	19.297*	-2.351	27.258*	0.233	0.072	0.277	-95.571*	-15.355	-61.301*
	(9.362)	(5.450)	(9.571)	(0.625)	(0.482)	(0.574)	(25.385)	(21.415)	(23.782)
Sex1	47.131*	9.583*	41.516*	1.511*	0.592*	1.232*	146.138*	40.023*	110.498*
	(4.421)	(2.080)	(4.466)	(0.301)	(0.196)	(0.265)	(12.694)	(7.785)	(12.751)
Employ1	-13.425*	6.904*	-25.527*	0.172	0.436*	-0.172	-23.737*	31.853*	-65.831*
	(3.646)	(1.725)	(3.669)	(0.242)	(0.170)	(0.218)	(10.480)	(6.169)	(10.258)
Fstamp1	-8.174	-1.131	-10.822	1.171*	0.059	1.361*	-39.887*	-33.529*	-20.248
	(7.070)	(4.383)	(7.017)	(0.660)	(0.392)	(0.631)	(20.859)	(14.501)	(20.035)
diet1	7.579*	-5.872*	12.763*	-0.652*	-0.617*	-0.203	1.094	-21.039*	17.805
	(4.494)	(2.009)	(4.590)	(0.302)	(0.213)	(0.271)	(12.510)	(7.156)	(12.407)
Hsize	-5.036*	-4.503*	-0.990	-0.129	-0.147*	0.098	-6.487*	-13.316*	6.590*
	(1.125)	(0.556)	(1.111)	(0.084)	(0.053)	(0.077)	(3.433)	(2.092)	(3.372)
Age	-1.004*	-1.553*	0.379	-0.056*	-0.070*	0.012	-13.652*	-10.178*	-4.791*
	(0.472)	(0.245)	(0.472)	(0.031)	(0.022)	(0.028)	(1.370)	(0.889)	(1.316)
Agesq	0.014*	0.013*	0.004	0.001*	0.001*	- a	0.113*	0.084*	0.043*
	(0.005)	(0.003)	(0.005)	(a)	(a)	(a)	(0.014)	(0.010)	(0.013)
Weekend	-4.809	2.131	-9.463*	-0.451	0.098	-0.222	-0.837	-9.982	-8.985
	(3.971)	(1.816)	(4.011)	(0.294)	(0.177)	(0.265)	(12.181)	(6.742)	(11.969)
Income	0.001*	a *	a	- a	a	- a	0.001	a *	-0.001
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Incomesq	- a	- a *	- a	- a	- a	a	- a	- a	a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*									
Adj R-SQ	0.0755	0.0632	0.0679	0.0172	0.0111	0.0121	0.1276	0.1140	0.0800
F-Tests Prob >F									
Urbanization	0.3736	0.2835	0.4409	0.3150	0.9176	0.3376	0.2693	0.0524	0.3920
Region	0.0001	0.0033	0.0011	0.0014	0.0847	0.0024	0.0001	0.0166	0.0001
Race	0.0014	0.1263	0.0122	0.2683	0.7337	0.1263	0.0001	0.3608	0.0001
Regression Type	wls	wls	wls	wls	ols	wls	wls	wls	wls

Variable	PHOSPHORUS ALL	PHOSPHORUS FAFH (MILLIGRAMS)	PHOSPHORUS FAH	MAGNESIUM ALL	MAGNESIUM FAFH (MILLIGRAMS)	MAGNESIUM FAH	IRON ALL	IRON FAFH (MILLIGRAMS)	IRON FAH
Intercept	533.919*	519.144*	269.943*	25.332	69.674*	15.478	6.954*	5.156*	3.731*
	(125.236)	(94.958)	(127.782)	(26.914)	(18.852)	(27.623)	(1.803)	(1.090)	(1.849)
Weight	0.563*	0.509*	0.268	-0.007	0.074*	-0.057	0.005*	0.005*	0.003
	(0.181)	(0.137)	(0.189)	(0.038)	(0.027)	(0.039)	(0.003)	(0.001)	(0.003)
Height	9.651*	0.233	6.918*	2.469*	0.239	2.007*	0.068*	-0.002	0.056*
	(1.929)	(1.470)	(1.969)	(0.416)	(0.292)	(0.429)	(0.027)	(0.016)	(0.028)
Urban1	6.088	4.125	0.111	6.871*	2.534	4.893	0.195	-0.038	0.186
	(14.943)	(11.320)	(15.647)	(3.223)	(2.236)	(3.344)	(0.212)	(0.012)	(0.219)
Urban2	-17.044	-5.113	-12.037	-0.087	-1.164	0.806	0.037	-0.107	0.070
	(12.454)	(8.990)	(13.124)	(2.643)	(1.795)	(2.766)	(0.176)	(0.100)	(0.182)
Region1	18.152	-3.360	34.253*	4.309	-1.339	7.627*	-0.163	-0.121	0.033
	(14.626)	(11.000)	(15.258)	(3.166)	(2.117)	(3.290)	(0.219)	(0.131)	(0.223)
Region2	15.678	-12.765	27.305*	0.091	-3.209*	1.842	-0.683*	-0.333*	-0.468*
	(13.535)	(9.632)	(14.202)	(2.887)	(1.931)	(3.010)	(0.194)	(0.105)	(0.200)
Region4	19.352	-31.422*	49.976*	5.927*	-2.375	8.979*	-0.823*	-0.386*	-0.480*
	(15.270)	(10.966)	(15.920)	(3.327)	(2.264)	(3.457)	(0.214)	(0.124)	(0.221)
Race2	-104.480*	5.362	-80.081*	-34.819*	-0.580	-29.798*	-1.001*	0.106	-0.865*
	(18.725)	(15.068)	(19.377)	(3.814)	(2.926)	(3.843)	(0.251)	(0.166)	(0.258)
Race3	-72.612	8.787	-67.037	1.319	5.473	1.744	1.292*	0.561	0.811
	(53.865)	(36.727)	(53.959)	(12.291)	(7.691)	(12.840)	(0.673)	(0.499)	(0.612)
Race4	56.709	71.624*	51.238	18.312*	15.337*	13.366	0.850	0.549	0.890
	(39.042)	(38.559)	(40.651)	(8.020)	(7.253)	(8.416)	(0.516)	(0.383)	(0.552)
Hisp1	-20.090	-42.534	23.542	1.820	-6.089	12.342*	0.093	-0.211	0.437
	(32.177)	(26.418)	(33.194)	(6.940)	(4.684)	(7.287)	(0.443)	(0.352)	(0.456)
Sex1	270.870*	80.480*	226.057*	52.504*	14.878*	43.586*	3.296*	0.894*	2.733*
	(14.885)	(11.180)	(15.502)	(3.170)	(2.185)	(3.296)	(0.213)	(0.125)	(0.221)
Employ1	-12.889	49.063*	-87.818*	-5.831*	9.372*	-20.725*	-0.286	0.428*	-1.022*
	(12.189)	(8.856)	(12.719)	(2.599)	(1.778)	(2.692)	(0.174)	(0.099)	(0.179)
Fstamp1	20.477	-40.325*	3.615	-6.785	-1.161	-4.159	-0.155	-0.004	0.005
	(25.546)	(20.548)	(25.936)	(5.265)	(3.936)	(5.250)	(0.333)	(0.245)	(0.338)
diet1	-22.058	-43.369*	10.942	4.641	-7.438*	10.952*	-0.460*	-0.477*	-0.106
	(14.568)	(10.430)	(15.217)	(3.273)	(2.100)	(3.445)	(0.211)	(0.122)	(0.219)
Hsize	-7.521*	-21.287*	16.393*	-3.387*	-4.573*	1.389*	-0.071	-0.229*	0.179*
	(4.020)	(2.878)	(4.143)	(0.827)	(0.567)	(0.838)	(0.056)	(0.032)	(0.057)
Age	-9.465*	-12.809*	2.055	1.049*	-1.675*	2.773*	-0.059*	-0.110*	0.041*
	(1.561)	(1.225)	(1.593)	(0.323)	(0.239)	(0.332)	(0.022)	(0.014)	(0.023)
Agesq	0.068*	0.108*	-0.021	-0.008*	0.014*	-0.022*	0.001*	0.001*	- a
	(0.016)	(0.013)	(0.016)	(0.003)	(0.003)	(0.003)	(a)	(a)	(a)
Weekend	9.156	6.786	-18.145	-1.818	1.094	-7.026*	-0.018	0.094	-0.314
	(14.242)	(9.684)	(14.848)	(2.957)	(1.918)	(3.054)	(0.200)	(0.112)	(0.205)
Income	a	0.001*	-0.002*	a *	a *	- a	a	a *	- a *
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Incomesq	- a	- a	a *	- a	- a *	a	- a	- a *	a
	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*									
Adj R-SQ	0.1747	0.1211	0.0983	0.1548	0.0857	0.1197	0.1054	0.0808	0.0744
F-Tests Prob >F									
Urbanization	0.1771	0.6421	0.5638	0.0490	0.2015	0.3029	0.6339	0.5527	0.6967
Region	0.4719	0.0287	0.0099	0.1891	0.3956	0.0207	0.0001	0.0025	0.0203
Race	0.0001	0.3129	0.0002	0.0001	0.1735	0.0001	0.0001	0.3209	0.0010
Regression Type	wls	wls	wls	wls	wls	wls	wls	wls	wls

Variable	ZINC ALL	ZINC FAFH	ZINC FAH	COPPER ALL	COPPER FAFH	COPPER FAH
		(MILLIGRAMS)			(MILLIGRAMS)	
Intercept	4.904*	3.095*	3.176	0.121	0.185	0.031
	(2.064)	(1.515)	(1.984)	(0.172)	(0.121)	(0.167)
Weight	0.011*	0.006*	0.007*	- a *	a *	- a
	(0.003)	(0.002)	(0.003)	(a)	(a)	(a)
Height	0.053*	0.029	0.021	0.011*	0.003*	0.005*
	(0.031)	(0.023)	(0.031)	(0.003)	(0.002)	(0.003)
Urban1	0.133	-0.075	0.083	0.020	0.024*	0.025
	(0.246)	(0.178)	(0.237)	(0.020)	(0.014)	(0.019)
Urban2	-0.304	-0.096	-0.297	-0.001	0.021*	0.012
	(0.206)	(0.148)	(0.198)	(0.016)	(0.011)	(0.015)
Region1	-0.372	-0.211	-0.118	0.019	-0.012	0.056*
	(0.245)	(0.174)	(0.235)	(0.019)	(0.013)	(0.018)
Region2	-0.321	-0.175	-0.186	-0.021	-0.011	-0.010
	(0.224)	(0.157)	(0.215)	(0.017)	(0.012)	(0.017)
Region4	-0.482*	-0.568*	0.015	-0.065*	-0.022	0.022
	(0.250)	(0.178)	(0.241)	(0.020)	(0.013)	(0.019)
Race2	-0.471	0.180	-0.287	-0.074*	0.025	-0.025
	(0.311)	(0.234)	(0.299)	(0.026)	(0.020)	(0.024)
Race3	-0.234	0.949	-0.626	0.056	0.059	-0.035
	(0.921)	(0.682)	(0.883)	(0.076)	(0.054)	(0.074)
Race4	0.776	0.606	0.767	0.099	0.150*	0.091
	(0.596)	(0.479)	(0.580)	(0.068)	(0.037)	(0.069)
Hisp1	-0.209	-0.423	0.258	0.016	-0.069*	0.075
	(0.507)	(0.424)	(0.489)	(0.053)	(0.032)	(0.053)
Sex1	3.155*	0.802*	2.649*	0.250*	0.066*	0.235*
	(0.240)	(0.172)	(0.231)	(0.021)	(0.013)	(0.020)
Employ1	-0.017	0.455*	-0.702*	-0.008	0.045*	-0.103*
	(0.203)	(0.149)	(0.195)	(0.015)	(0.011)	(0.015)
Fstamp1	-0.218	-0.146	0.003	0.077*	-0.035	0.094*
	(0.407)	(0.344)	(0.391)	(0.036)	(0.026)	(0.036)
diet1	-0.964*	-0.633*	-0.501*	0.043*	-0.071*	0.022
	(0.249)	(0.187)	(0.239)	(0.019)	(0.014)	(0.020)
Hsize	-0.023	-0.238*	0.225*	-0.019*	-0.023*	0.008
	(0.065)	(0.047)	(0.063)	(0.005)	(0.003)	(0.005)
Age	-0.033	-0.133*	0.071*	0.007*	-0.009*	0.014*
	(0.025)	(0.019)	(0.024)	(0.002)	(0.002)	(0.002)
Agesq	a	0.001*	-0.001*	- a *	a *	- a *
	(a)	(a)	(a)	(a)	(a)	(a)
Weekend	0.749*	0.467*	0.171	-0.011	0.036*	-0.033*
	(0.230)	(0.155)	(0.221)	(0.018)	(0.013)	(0.018)
Income	- a	a	- a *	a *	a *	- a
	(a)	(a)	(a)	(a)	(a)	(a)
Incomesq	- a	- a	a	- a *	- a	a
	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*						
Adj R-SQ	0.0831	0.0488	0.0562	0.0906	0.0616	0.0943
F-Tests Prob >F						
Urbanization	0.1136	0.8065	0.1443	0.4878	0.1037	0.4166
Region	0.1940	0.0169	0.7974	0.0009	0.4464	0.0043
Race	0.2337	0.2805	0.3459	0.0129	0.0006	0.3827
Regression Type	ols	ols	ols	wls	wls	wls

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Variable	SODIUM ALL	SODIUM FAFH	SODIUM FAH	POTASSIUM ALL	POTASSIUM FAFH	POTASSIUM FAH
	(MILLIGRAMS)			(MILLIGRAMS)		
Intercept	1174.688*	1520.122*	122.093	531.328*	867.526*	66.719
	(331.398)	(295.862)	(363.886)	(267.298)	(207.226)	(276.852)
Weight	1.983*	1.556*	0.894*	0.441	0.817*	-0.064
	(0.499)	(0.429)	(0.518)	(0.384)	(0.295)	(0.401)
Height	21.376*	-1.048	20.772*	20.554*	1.387	15.934*
	(5.105)	(4.606)	(5.636)	(4.134)	(3.215)	(4.289)
Urban1	-103.935*	-39.911	-90.251*	-16.553	-0.656	-20.851
	(39.663)	(34.441)	(40.928)	(31.444)	(24.356)	(32.947)
Urban2	-18.992	-22.221	-3.014	-25.063	-28.961	-6.924
	(33.858)	(28.361)	(35.176)	(26.374)	(19.876)	(27.890)
Region1	-7.394	-57.944*	59.476	105.685*	2.111	127.576*
	(40.427)	(33.637)	(41.598)	(31.268)	(23.645)	(32.599)
Region2	16.039	-44.289	61.869	43.838*	-18.705	55.438*
	(37.229)	(30.884)	(38.404)	(28.735)	(21.171)	(30.229)
Region4	-158.734*	-95.729*	-65.758	19.913	-40.965*	63.012*
	(39.995)	(34.038)	(41.031)	(31.753)	(24.329)	(33.401)
Race2	-77.105	-6.886	20.752*	-323.589	-9.496	-265.038*
	(51.179)	(44.291)	(53.473)	(38.688)	(32.158)	(39.313)
Race3	432.374*	40.122	531.192	-89.809	-6.250	-72.275
	(146.051)	(127.879)	(154.921)	(111.270)	(73.328)	(118.400)
Race4	98.096	93.966	136.930	225.968*	183.580*	172.659*
	(105.151)	(107.172)	(110.510)	(81.439)	(80.213)	(84.937)
Hisp1	-136.649	-110.022	8.454	-61.772	-70.849	41.234
	(87.596)	(89.083)	(88.826)	(66.943)	(50.610)	(70.525)
Sex1	1084.163*	243.653*	917.059*	543.110*	177.648*	437.916*
	(40.634)	(34.460)	(43.383)	(31.483)	(24.019)	(32.920)
Employ1	38.379	119.774*	-170.769*	-70.065*	98.223*	-224.984*
	(33.163)	(27.799)	(33.897)	(25.764)	(19.587)	(26.887)
Fstamp1	48.891	-57.034	107.696	-93.252*	-22.982	-52.381
	(72.024)	(63.337)	(72.631)	(52.740)	(43.567)	(53.044)
diet1	-254.186*	-119.619*	-150.434*	20.273	77.283*	84.073*
	(38.244)	(32.717)	(38.256)	(31.181)	(23.131)	(33.114)
Hsize	36.353*	-67.443*	111.969*	-27.264*	-52.994*	25.516*
	(11.087)	(8.410)	(11.395)	(8.270)	(6.154)	(8.530)
Age	-15.716*	-31.221*	8.622*	9.660*	-19.360*	27.186*
	(4.186)	(3.751)	(4.246)	(3.230)	(2.646)	(3.365)
Agesq	0.114*	0.272*	-0.061	-0.080*	0.177*	-0.216*
	(0.043)	(0.040)	(0.043)	(0.033)	(0.028)	(0.035)
Weekend	49.749	12.558	-28.713	-45.843	9.865	-99.487*
	(37.766)	(29.419)	(38.828)	(29.059)	(20.600)	(30.387)
Income	-0.002*	0.003*	-0.008*	0.002*	0.002*	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Incomesq	a	- a *	a *	- a	- a	a
	(a)	(a)	(a)	(a)	(a)	(a)
Imratio*						
Adj R-SQ	0.2714	0.0879	0.1917	0.1568	0.0859	0.1169
F-Tests Prob >F						
Urbanization	0.0224	0.4983	0.0427	0.6356	0.2441	0.8152
Region	0.0001	0.0388	0.0101	0.0074	0.3039	0.0015
Race	0.0065	0.8286	0.0048	0.0001	0.1420	0.0001
Regression Type	wls	wls	wls	wls	wls	wls

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