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ABSTRACT

Estimates were made of the effects of school lunch participation and various socioeconomic, anthropometric, and psychological variables on the consumption of 20 food items by 8- to 12-year-old children. The study sample consisted of 845 school children in the State of Washington, stratified by ethnic group and by poverty level so that it contained a higher proportion of Black, Mexican American, and below-poverty children than existed in the state. The sample consisted of 436 White, 215 Black, and 194 Mexican American children. Explanatory variables examined included height and weight of the child, household size, income, assets, ethnic group, age, sex, food attitudes, geographic origin, nutritional concern and basic need level of the person in the household responsible for food preparation, whether or not the child had breakfast, and geographic location within the State of Washington. Children fully participating in the lunch program had a higher consumption of fluid milk, mixed dishes, canned vegetables, fats and oils, and sauces and toppings than nonparticipants. Full participants had a lower consumption of fresh fruit, bread and rolls, and cooked cereal. The question of whether these differences stem from school lunch participation or whether they stem from inherent differences in food consumption was examined. (JHZ)

THE EFFECTS OF SCHOOL LUNCH PARTICIPATION, SOCIOECONOMIC AND PSYCHOLOGICAL VARIABLES ON FOOD CONSUMPTION OF SCHOOL CHILDREN

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The Effects of School Lunch Participation, Socioeconomic and Psychological Variables on Food Consumption of School Children

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Introduction

The school lunch program has been defended as a means of improving the nutritional well-being and reducing hunger of school children. The Federal Government has for a number of years subsidized school districts that have feeding programs which comply with Federal regulations.

During 1978 over 26 million children participated in the National School Lunch Program. Within those schools participating in the program, 60% of the students participated in the program. Annual Federal cost of the school lunch program was $1.8 billion (19). Thus, it is important to know how this program affects food consumption of the participants.

Price et al. have examined the effects of school lunch participation on the nutrient intake of children in Washington State (6, 8). They found nutrient intake to be higher for participants than nonparticipants or partial participants for five of ten nutrients while nonparticipants had significantly higher intakes of iron. Partial participants had significantly lower intakes of energy and thiamin than did either full participants or nonparticipants. Children from the single nonparticipating district had higher intakes of protein, calcium, phosphorous, and riboflavin than did children from other districts. The lower intakes of partial participants and the higher intakes of children from the nonparticipating district were not explained satisfactorily.

A study of the consumption of specific foods should reveal which items are either positively or negatively affected by school lunch participation. In addition, analyses of the consumption of specific foods should reveal information concerning the effects of other important variables affecting consumption. In this study numerous socioeconomic variables were measured as well as height and weight of the child. These included household size, income, assets, ethnic group, age, sex, food attitudes, height of the child, geographic origin, nutritional concern, and basic need level of the person in the household responsible for food preparation, whether or not the child had breakfast, and geographic location within the state of Washington (table 1). These variables are of interest in their own right but when included in a regression model they also serve as control variables when analyzing the effects of school lunch participation. The effects of some of these variables such as basic need levels and assets on food consumption are not well established.[1] Previous analyses of the same data have shown the effects on household food expenditures (10, 21). This study gives an opportunity to examine the effects of several variables on food consumption of children.

The Sample

The sample consists of 845 school children ages 8-12 years.[2] The sample was stratified by ethnic group and by poverty level so that it contains a higher proportion of Black, Mexican American, and below poverty children than exists in the state of Washington. The sample, therefore, consists of 436 White, 215 Black, and 194 Mexican-American children.

Data were collected during the spring of the 1971-72 school year and throughout the 1972-73 school year. The sampling process consisted of three steps: (1) selecting school districts, (2) selecting schools within the district, and (3) selecting children within the schools. The school districts were selected by first stratifying by district size and by geographic area. Weights for each stratum were proportional to the state's school population in each stratum. Districts within each stratum were drawn by probability sampling with higher probabilities given to districts with significant numbers of Black and Mexican-American children

Schools within districts were drawn with the help of school district personnel with higher probabilities given to schools with significant numbers of Blacks and/or Mexican Americans. Children in selected schools were stratified into 12 groups. The strata were the three ethnic groups, the two poverty levels and participants and nonparticipants in the school lunch program. Subjects were drawn at random from the 12 groups.

[1]Basic need levels are defined on page 4

[2]Sample sizes differ for different aspects of the Washington State school lunch study because of missing data

The sample does not include Orientals or American Indians. In October of 1972 they represented 1.5% and 1.7% of the state's school population respectively (13). The sample also excluded districts with fewer than 100 students. These districts accounted for 3.4% of the state's white school population, 1.8% of the Mexican-American children and .01% of the Black children. For a more complete description of the sample see Price and West (7).

Types of Foods Selected

The dependent variables consisted of the quantity of specific food items consumed by the child as measured by three 24-hour recalls.[3] Procedures for collecting the 24-hour recall data were developed by Genevieve E. Scheier. For a more complete description of these procedures see Chapter VI (6). The recalls were made on different days of the week with one recall being made on Monday morning.[4] Thus, the food consumed by the child on the weekend is represented. Recalls were also spaced at different times of the month to prevent differences due to pay period.

Prior to weekday recalls, interviewers recorded the amount the child ate at the school lunch. Portions of the foods served at the school were weighed and the amounts traded or wasted were estimated by observers posted in the lunch room. School lunch consumption was, therefore, close to actual intake and was not recall data. Photographs of the school lunch were used by interviewers as reference points for identification and quantification of the foods consumed. There were 30 food models available to each interviewer to aid in estimating quantities consumed. Studies by Madden, Goodman, and Guthrie (5), and by Greger and Etnyre (3) show potential errors in recalling amounrs of certain types of foods. It is not known how much of this type of error is prevalent in this study. It is believed that the school lunch reference point, the food models, and the probing technique have minimized such errors.

Socioeconomic data were collected by household interview with the person in charge of food preparation. (Further details on interviews and procedures are given in Price et al. (6).)

The total number of food items consumed by the sample is relatively large. To reduce the number and to minimize the statistical problem inherent in estimating coefficients when a large proportion of the dependent variable consists of zero consumption, combinations of items were made and estimates were made for only those items with a relatively low proportion of nonconsumers.

The basic problem of zero observation is as follows. In a survey such as this with three 24-hour recalls, zero consumption can be initially divided into two categories: (1) the item is consumed but was not consumed in the 3-day period because of chance; (2) the item is never consumed. The first category gives no problem of inherent bias in the estimates of the coefficients if the zero observations are included (14). Nonconsumption is a random event. In the case where the item is never consumed, techniques such as Tobit analysis are required (13). With the analysis of major food categories, most of the nonconsumption should be due to chance. Therefore, ordinary least squares was used in this analysis.

There were 48 categories of foods used by nutritionists on this project (see appendix table A). For the purpose of this analysis 16 of these items were selected (table 2). Additionally, four combinations of items were made. The major dairy products, cheese, ice cream, and fluid milk were aggregated as expenditures by using the January 1973 Seattle retail prices (18). All meat items were aggregated by simply summing grams of consumption. The same was done for vegetables with the exception that dried vegetables were excluded. Fruits were likewise summed with dried fruits first being multiplied by a factor of 4.3 to place them on a fresh equivalent basis. This factor of 4.3 is an approximation for the conversion for commonly consumed dried fruit. See *Conversion Factors* (17). The other 16 dependent variables were mainly those with the lowest percentages with zero consumptin.

Justification of Explanatory Variables

School Lunch Participation

Six variables specifying the effects of participation in the school lunch program were hypothesized for this study (table 1). Lunch participation was divided into three categories nonparticipants, partial participants, and full participants If the lunch affects consumption of a given food item and if no nonlinearities exist, partial participants should consume a quantity midway between full participants and nonparticipants. Previous analysis of the data with nutrient intake as the dependent variable found a nonlinear relationship with partial participants having the smallest amounts of intake of the three groups. This study explores this in greater de-

[3]Most (over 90%) but not all children completed three acceptable 24-hour recalls. Some children are represented by one or two recalls.

[4]The interviews were Tuesday morning when Monday was a holiday.

tail by examining specific food items and by using two interaction variables: female full participant and female partial participant. This will indicate differences between male and female lunch participation and in particular explore the question of whether the above nonlinearity in participation occurs among both males and females.

The final variable specifying participation was the nonparticipating district. These children were identified as being separate from other nonparticipating children in order to analyze the two types of selectivity bias subsequently discussed. If no selectivity bias exists and if the same alternative food sources, such as the special milk and vending machines, are available to nonparticipants in participating districts as are available to students in nonparticipating districts, nonparticipants should generally consume the same types and quantities of food.

One additional aspect of the sample with respect to selectivity bias should be discussed. In the participating districts there were almost no children eligible for the free or reduced price lunch who did not participate fully in the lunch program. Therefore, nearly all below poverty nonparticipants were in the nonparticipating district. Since the previous research on nutrient intake with this sample showed no significant relationships with income, little difference in consumption between children of high and low income groups would be expected. Therefore, no interaction terms with income and lunch participation were included. Additionally, interaction terms between the two ethnic groups and participation were tried. Neither variable showed significant effects on consumption. Since the Mexican-American children generally came from relatively poor households one would expect no significant effects from an income-participation interaction term.

School lunch participation was hypothesized to increase consumption of those items commonly served in the school lunch and to decrease consumption of those items usually brought in the alternative sack lunch. Indirect effects were also hypothesized. That is, school lunch participation was hypothesized to decrease the consumption of snack items because the child would not be as hungry in periods of the day when snacks are usually consumed.

Lack of Breakfast

Children coming to school without breakfast were hypothesized to have a lower consumption of those items usually eaten at breakfast. It was also hypothesized that they would have a higher consumption of non-breakfast items to make up for the missed meal. Lack of breakfast was measured by hours of fasting recorded on a morning interview with the child.

Age, Sex, and Height

The age, sex, and size of the child would be expected to affect consumption of various items. Older children would be expected to eat more of most items. As children grow older, however, tastes change so that consumption of some items may not change or even decrease. A previous study showed a decreased preference for "kid-type" food as the child grows older (9). The same study showed differences in preference by sex of the child. The study on nutrient intake showed females to consume less of most nutrients. Therefore, the female is sypothesized to consume less of most items but to have different preferences which may result in higher consumption of some of the low calorie foods such as many of the fresh fruits.

Two variables were available to specify the size of the child relative to his/her age and sex: height as a percentage of standard for age, and weight as a percentage of standard for height and age. It was hypothesized that the taller and heavier the child, the larger the food consumption. Weight as a percentage of standard was not significant at the .05 level for any of the food items so was dropped from the model. This lack of relationship presumably occurs because the heavier child may be attempting to lose weight or because the heavier weight is due to causes other than a larger intake of food.

Geographic Area within the State

Five geographic areas within the state of Washington were formed for the purpose of this analysis (table 1.) The state was first divided into three areas—Eastern, Central, and Western Washington. These areas differ with respect to both climate and population density. Central and Eastern Washington are both drier with cooler winters and warmer summers than Western Washington. They are also generally more rural in character. Due to the larger sample in Western Washinton, the area was broken down into three sub-areas: central city, suburban, and rural. These breakdowns, of course, reflect rural-urban differences. Consumption in the various geographic areas may also be affected by proximity to locally grown farm products. Rural Western Washington is a dairy area. Central Washington produces substantial quantities of fruits and vegetables. Eastern Washington is primarily a wheat-pea-livestock area. It was hypothesized that consumption of locally produced farm products would be higher than consumption of these products in other areas. This was hypothesized to be due to the lower cost, greater availability, and greater exposure to local promotional efforts for these products. It is difficult to hypothesize the causality for urban-rural differences or for climatic differences. People generally eat "lighter" foods, with

more fruits and salads, in warmer weather than in cold weather. It has been traditionally hypothesized that rural areas consume more of the "heavier" foods such as meat and potatoes than the central city or the suburbs. These rural-urban differences may be disappearing as mechanization takes place and as the sociological differences between areas becomes less. To summarize, children from rural areas are hypothesized to consume less fruits, but more meat and grain products than their city counterparts.[3] The effect of climate on consumption in these five areas cannot be hypothesized.

Ethnic Group

A previous study has shown food patterns of the households of the children in this sample to differ by ethnic group (11). A much larger proportion of Mexican-American households serve the traditional Mexican dishes, such as tacos, enchiladas, and refried beans than other households. Similarly, a higher proportion of Black households serve "soul" foods such as collards, sweet potatoes, and ham hocks. Thus, foods that have been traditional with certain ethnic groups are still more commonly served among these groups. Blacks additionally are hypothesized to consume less milk than Whites because of such things as custom, lactose intolerance, or the publicity associated with lactose intolerance. With respect to this study, it was hypothesized that Black children consume less fluid milk than others and that Mexican-American children consume less meat than others The reason for the latter hypothesis is the substitution of meat for beans among Mexican-American households.

Geographic Origin

The geographic area in which the person in charge of food preparation was raised was hypothesized to affect household food patterns. In this sample just over 50% were raised in the Western United States (table 1). Important numbers were also raised in the Southeast and the combined areas of the Northeast and Central United States. According to the 1965 USDA Food consumption survey (16), households in the Southeastern United States had lower consumption of dairy products and fresh fruit but a higher consumption of fats and oils, fresh vegetables, sugars and sweets, and flour and cereal than households in the West. According to the same source, consumption of dairy products was higher in both the Northeast and North Central areas of the United States than in the West, while meat consumption was higher in the North Central states than in the West. Under the hypothesis that persons retain at least some of the food patterns where they were raised, it was hypothesized that the above differences would occur in the consumption of Washington school children.

Nutritional Concern of Parents

The nutritional concern of the mother or person in charge of household food preparation was not measured directly, but there were two variables acting as proxy variables for this concern: the education of the female head, and whether or not the child was taking a multiple vitamin supplement. Nutritional knowledge was hypothesized to be positively correlated with the general educational levels of the female head. Additionally, changes in the educational level alter the social situations to which the individual is exposed. These may affect food patterns. Whether or not the child takes a multiple vitamin supplement was hypothesized to measure the mother's nutritional concern for the child. There is a school of thought that says it is better to eat the proper foods and not take vitamin supplements, i.e., a mother could be highly concerned with the nutritional well-being of the child without the child taking supplements. This hypothesis, thus, needs to be modified to express the mother's concern for nutritional well-being when the mother considers vitamin supplements to enhance nutritional well-being.

Basic Need Levels

Basic need levels of the person in charge of food preparation were hypothesized to affect household food patterns. The effect of social and psychological factors on consumption patterns has long been recognized. Consumer expenditures, as all behavior, are motivated by needs. Self-actualization theory views all behavior as motivated by a progressive level of needs (2, 4). These need levels progress from basic, deficiency needs up through higher, growth-oriented needs.

The five need levels in terms of ranking from the most basic to the highest level are (1) physiological, (2) safety and security, (3) love and belonging, (4) self-esteem, and (5) self-actualization. Psysiological needs include basic biological needs for food, drink, etc. These needs are least significant to many, but not all, people in our society since they are often satisfied to a fairly high level. Safety or security relate to the preservation of the "status quo" and are reflected by a great desire for protection, order, and structure. The need for love and belonging includes such specifics as the desire for an intimate relationship with another person, for acceptance as a member of an organized group, and for a familiar environment. Self-esteem is a two-part need consisting of respect from others and self-

[3] The children in rural Central Washington would be hypothesized to consume less fruit than others because they are in rural areas but more than others because they are in a fruit growing area. It is not a priori known which effect is stronger

respect. One receives many indications from other people of respect, admiration, and value. Once a given level of respect has been received, one can move to an internally based respect. The final need, self-actualization, is a unique, highly personalized type of need. A person operating according to this need feels free to live according to his or her own dictates. This type of person who is highly creative, unafraid of change and willing and eager to take risks is likely motivated by the need for self-actualization. It is hypothesized that consumption of simple, basic foods will satisfy the most basic need, the physiological needs. A higher value for this need will be positively correlated with consumption of basic foods. A related study using the same household data as this study showed food expenditures to be positively related to physiological need (20).

Since foods can represent a variety of factors to individuals, the specific food items consumed can be related to any need level. Cultural factors, ethnic background, geographical origin, and early family life style can combine to associate certain foods or food patterns with certain need levels. This indicates that variables in which need levels interact with the above variables should be specified. Little empirical analysis has been carried out specifying the relationship between need levels and food consumption. Therefore, for the sake of simplicity, no such interaction terms were included in this analysis.

A high consumption of familiar foods was hypothesized to be positively related to a high security need. Foods associated with gatherings of family and friends would be important to those with a high need for belonging. Those who are at a high self-esteem level would want prestige or status foods. Finally, it was hypothesized that individuals at a high self-actualization level would be induced to try new foods and use a greater variety of foods. A previous study with the same household data showed the number of fruits and vegetables served to be positively related to self-actuilazation need (10)

Financial Well-Being

Income has traditionally been hypothesized to positively affect the higher priced foods, have little or no effect on the medium priced foods and have a negative affect on the least expensive foods. The analysis of the relationship between income and nutrient intake of the child with this data showed little relationship with income (8). However, since nutrients come from many sources, any income effect may have been "washed out." This analysis did, however, show some relationships between liquid assets and intake of certain nutrients.

Another related study using this same household data showed the assets to be significantly related to total food expenditures Likewise, income was positively related but with a low income elasticity of (19) A related study on the types and variety of fruits and vegetables served in the home showed liquid assets to affect many more items than current income which was a relatively weak explanatory variable (10).

Jean Crockett posits that the asset-expenditure effect varies with the ratio of the household's actual to desired holdings of assets (1). Households whose actual level of assets meet or exceed desired levels have a high propensity to consume from assets. In any empirical analysis it is, therefore, essential to hold the desire to accumulate assets constant. In this study only households with school aged children are included This holds the stage in the life cycle constant. It will be argued that families in the same stage of life cycle should have to some degree a similar desire to accumulate wealth. That is, they are in the same life cycle stage relative to the need to accumulate assets for retirement, children's education, etc Desires to accumulate assets should therefore be relatively constant in contrast to a sample that included young married couples who may be accumulating assets for a house purchase, older families without children and nearing retirement age, and retired couples who may be using accumulated assets as an important source of income

Household Size

Household size may affect food consumption in more than one way. First, larger households generally have lower incomes on a unit equivalent basis than do smaller households In this study, income and assets were placed on a per adult equivalent basis which should, if the specification is correct, nullify this effect The second effect is on the type of food served. Larger households can more efficiently utilize different types of foods than can smaller households Large roasts are an example Third, menu selection may be different for the larger household because of the number of personal food preferences to be considered Two opposing effects may be hypothesized Either the larger household may serve less variety since only a limited number of items satisfy everyone's preference, or the wider variety of individual preferences may lead to a wider variety of foods served

A related study has shown that the larger households serve a wider variety of fruit and vegetable items than do smaller households which gives credence to the latter hypothesis (10) Another related study showed that food expenditures were negatively affected by household size even though expenditures were placed on an adult-equivalent basis, and economies of size found in the 1955 USDA household survey were incorporated

into the scales (19). It was hypothesized that economies of this size in addition to those specified were prevalent among this sample. Such economies may be the result of such things as less food waste and economies of size in addition to those specified were affect the consumption of the child. If food is less available in the larger household, however, or if parents pay less attention to the child, and consequently the youngster chooses to eat less in the larger household, consumption could be negatively related to household size.

Occupation

In the related study of the nutrient intake (8) of the child, the only occupational grouping found to affects intake significantly, was the Armed Forces. It was not known why intakes of this group were higher. It was conjectured that the amount of physical activities of the children or eating habits learned in Army mess halls that carried over to the household were responsible. The other major occupational groups (white collar, blue collar, service, unemployed) were tried in an earlier model explaining consumption of individual food items but were dropped because of lack of any significant relationships.

Food Attitudes of Child

One final variable, the number of foods the child was unwilling to try, was included in the model. This variable was formed from a food preference instrument administered to the child. It included 21 fruits and vegetables, 17 milk and milk products, and 20 assorted foods frequently served in school lunches. For more details, see Price and Price (12). Vegetables were one of the most common items that the child was unwilling to try. Other items the children frequently were unwilling to try, such as buttermilk, were not in the list of dependent variables for this study. Therefore, this variable was included only in the three vegetable models. This variable is an indicator of the absolute preference for a number of vegetables as well as an indicator of the variety of vegetables the child is willing to eat A negative relationship between the quantities of vegetables consumed and the number of foods the child was unwilling to try would be expected.

Results

For ease of interpretation, results are expressed as the percentage change in the dependent variable per unit change in the explanatory variable (table 3). More specifically, it is the linear regression coefficient divided by the mean of the dependent variable. Since household size, income, and liquid assets are expressed as logarithms, these coefficients are elasticities at the mean levels of the dependent variables.

R^2 values were not particularly high, ranging from 154 for dairy products to .046 for sausages and luncheon meats. The F values for the equations were significant at the 01 level for all models except sausage and luncheon meat which was significant at the 05 level.

Selectivity as

One of the problems associated with the analysis of policy effects is selectivity bias. In this case it is possible that nonparticipating children differ from participating children in ways other than school lunch participation. For example, if children who like to eat. and consequently eat more, participate in the school lunch program, while those who eat less do not, there would be selectivity bias in determining the effect of school lunch participation on consumption. One way to control for selectivity bias is to include in the model all important variables affecting consumption. To avoid selectivity bias, all variables affecting consumption are not needed, but those affecting both consumption and participation in the program are needed. If, for example, older children are less likely to participate in the lunch program, a model that excluded age of child would lead to the result that the effects of the lunch program are smaller than they actually are since the older child consumes more food. The large number of variables included in this study helps to minimize selectivity bias, but there is no way of determining if selectivity bias still substantially affects the results.

One possible way to avoid the aforementioned selectivity bias is to select school districts that do not participate in the school lunch program and compare consumption with districts that do participate. In order to do so, the participation rate for the nonparticipating district would have to be assumed.: This could be done by using participation rates for comparable districts.

It is possible, however that this procedure will introduce a second type of selectivity bias. That is, it is possible that the district does not participate in the lunch program because the children in that district are particularly well fed.

This study includes students that do not participate in the lunch program from both participating and nonparticipating districts. Comparisons will be made in an attempt to delineate the effects of participation in the lunch program on the consumption of specific food items

School Lunch Participation

Full participants in the lunch program had significantly higher consumption of fluid milk, dairy products, mixed dishes, canned vegetables, fats and oils, and sauces and toppings than did children not participating in the

lunch program (...le 3). Nonparticipants had significantly higher consumption of fresh fruit, all fruit, bread and rolls, and cooked cereal than did full participants. The higher consumption of mixed dishes, canned vegetables, and sauces and toppings by the full participants and the lower consumption of bread and rolls is very likely due to the difference between the common sack lunch and the school lunch. The sack lunch usually consists of sandwiches while the school lunches frequently contain canned vegetables, mixed dishes, and dishes with sauces and toppings. To examine the effects of school lunch participation more thoroughly, results should be viewed in light of the types of selectivity bias discussed above.

Consider the possibilities: student selectivity bias, district selectivity bias, and no selectivity bias. Student selectivity bias can be further divided into three types: (1) the partial participating males being different than other students; (2) the partial participating females being different from other students; and (3) the full participants being different from others.

First consider the partial participants. If this group is like the group of full participants and nonparticipants in every way except lunch participation, consumption of items affected by the school lunch should be halfway between that by full participants and nonparticipants. There should be no difference in the consumption of other items. Examination of tables 4 and 5 show this is not the case. In most cases the consumption by male partial participants is either close to that of nonparticipants or close to that of full participants. Thus there is a strong indication of selectivity bias when using this group to analyze the effects of the school lunch program. Additionally, the results show the female partial participant to be different than her male counterpart. She more nearly fits the hypothesis that her consumption is intermediate between full participants and nonparticipants

If the type of selectivity bias exists in which full participants have different food consumption patterns than nonparticipants, and no district selectivity bias exists, food consumption by students in the nonparticipating district should be about midway between full participants and nonparticipants That is, about one-half of this age school children participate in the lunch program. If for some reason, other than lunch participation, food consumption between participants and nonparticipants differs a group without access to the school lunch should consume an amount equal to the average of participants and nonparticipants.

To proceed with the analysis, each commodity which has a significant regression coefficient at the .05 level or less with one of the school lunch participation variables will be considered.

Fluid milk and dairy product consumption is higher among full participants and students from the nonparticipating district than it is among nonparticipants Consumption by female partial participants is similar to that of full female participants while consumption by male partial participants is similar to male nonparticipants. Since dairy product consumption is dominated by fluid milk, only fluid milk consumption will be considered. Unlike other foods served in the school lunch, fluid milk is also available to nonparticipants. The nonparticipating district had the special milk program. Thus. without selectivity bias one would expect equal consumption among the various types of students Another hypothesis is that milk is not as readily available to the nonparticipant because of the nuisance value or some social stigma of obtaining the milk. To be a valid hypothesis, this nuisance value and or social stigma would not prevail in the nonparticipating district unless there were also a district selectivity bias. The examination of the other types of foods and the fact that there are geographic differences within Washington suggests that district selectivity bias does exist for this nonparticipating district. Before reaching a conclusion whether the lower consumption of nonparticipants is selectivity bias or the nature of the lunch program, the effects of program participation on other food items will be examined.

Mixed dishes show a higher consumption for participants than nonparticipants Consumption by female partial participants is about midway between female participants and female nonparticipants This evidence and the fact that mixed dishes are frequently served in the school lunch suggests that the difference is due to the lunch program. Consumption of mixed dishes in the nonparticipating district is too high to be consistent with this conclusion. The district selectivity bias argument must be evoked if this conclusion is to be valid The fact that significant geographic differences do exist gives some credence to the district selectivity bias argument

The results for canned vegetables raise some question as to whether their consumption is increased by participation in the school lunch program. First, full participants differ significantly from nonparticipants only at the 10 level. Female partial participants are slightly but not significantly lower than female nonparticipants. The significantly lower consumption of the students from the nonparticipating district is consistent only with district selectivity bias

The consumption of fresh fruit was significantly lower for lunch participants than for nonparticipants Since this item is commonly served in the school lunch and frequently brought from home in the sack lunch.

the finding is of particular importance. The consumption by the female partial participants and that of the students from the nonparticipating district (after being corrected for geographic area) both support the finding of the lunch being the cause of the lower fresh fruit consumption (table 4). The results suggest that student selectivity bias is not prevalent.

The results for all fruit are similar to those for fresh fruit with the exception that the female partial participant's consumption is equal to that of the female full participant. The case against selectivity bias is not as strong as it is for fresh fruit since consumption (corrected for geographic area) by the students from the nonparticipating district was lower than for nonparticipants (table 4)

The consumption of bread and rolls fits the hypothesis that it is lowered by participation in the school lunch. The consumption of bread and rolls by full participants is significantly lower than that by nonparticipants. The consumption of bread and rolls by the female participants is between female full participants and female nonparticipants, and the consumption by the children in the nonparticipating district is equal to that for nonparticipants (after being corrected for geographic differences)

The lower consumption of cooked cereal by full participants can be interpreted in two ways First, since cooked cereal is not served in the school lunch, and the consumption of the female partial participants and the students from the nonparticipating district are between participants and nonparticipants, student selectivity bias may be present. That is, nonparticipants like cooked cereal or come from homes where cooked cereal is more likely to be served than full participants Another feasible hypothesis is that parents are more likely to serve a hot breakfast to nonparticipants than to participants since the nonparticipants do not receive a hot lunch From the data, both interpretations are possible

Ready-to-eat cereal shows little differences between full participants and nonparticipants Female partial participants are similar to their female counterparts. The high consumption in the nonparticipating district may be an indication of district selectivity bias

The same conclusion can be made for sweets, jams, and jellies An alternative conclusion is that candy is more readily available in the nonparticipant district According to a questionnaire, however, filled out by the superintendent of that district, no candy vending machines were present in the sampled schools

The consumption of fats and oils was higher among full participants than among nonparticipants If no selectivity bias exists, this suggests children consume more fats and oils from the school lunch than from the typical sack lunch. The low consumption of fats and oils in the nonparticipating district again suggests district selectivity bias The consumption level of the female partial participant was about equal to that of the female full participants which is higher than that expected under the hypothesis of no student selectivity bias With the relatively large standard error on the coefficient, however, selectivity bias is certainly not disconfirmed.

Consumption of sauces and toppings was higher for the full participants than for the nonparticipants. Even though table 4 indicates a significant difference at the 10 level, the t value of the coefficient was 1 95, which is very close to the .05 level (table 3). The consumption of both the female partial participants and the consumption of students in the nonparticipating district give credence to the hypothesis of no selectivity bias.

In summary, the higher consumption of mixed dishes, canned vegetables, and sauces and toppings and the lower consumption of bread and rolls by the full participants is expected from the items usually served in the school lunch and the sack lunch It is less clear but likely that the lower consumption of fruit and the higher consumption of fats and oils by full participants is also due to the differences in what students consume from the school lunch and from the sack lunch. If no other difference in consumption existed there would be strong evidence that little selectivity bias exists between full participants and nonparticipants Female partial participants to a degree fit the hypothesis of little selectivity bias The consumption by the male partial participant and the students from the nonparticipating district indicates that these groups differ from the full and nonparticipants, and that selectivity bias would lead to errors in inference if used to infer the effects of the lunch program

The lower consumption of cooked cereal and higher consumption of fluid milk by the full participants raises questions concerning selectivity bias between full and nonparticipants Milk consumption differences can be explained only if there are institutional or psychological barriers to obtaining milk by the nonparticipants. There is not sufficient data to confirm or to disconfirm this contention. The lower consumption of cooked cereal can be explained by a greater concern of the parent for giving the nonparticipant a hot breakfast because of not having a hot lunch. Again, there is no data to support or refute this contention With the types of foods showing significant differences and the other comparisons made, it appears that there is little selectivity bias in comparing full participants with nonparticipants and that the differences shown in tables 1 and 5 are the result of participation in the school lunch program

Lack of Breakfast

The hours of fasting variable showed consumption of fluid milk, major dairy producrs, the food group labeled biscuits including waffles and pancakes, the food group including pastries and doughnuts, and ready-to-eat cereal to be lower for those students coming to school without breakfast (table 3). Consumption of mixed dishes and fresh fruits was higher for the students missing breakfast. All food items with a negative relation with missing breakfast are items usually eaten at breakfast. The two items with a positive relationship with missing breakfast give some indication that when students miss breakfast, consumption of other food is increased. The study of nutrient intake using this data did show lower intakes of calcium, phosphorus, thiamin, and riboflavin for those children not eating breakfast (6). Therefore, increased consumption of items associated with other meals does not compensate for the decrease in nutrient intake from lack of a breakfast.

Age, Sex, and Height

Older children generally eat more food than younger children. The increases, however, are not uniform across all food items. Of the 20 food items analyzed, consumption of 12 had a significant positive association with age, 1 had a ignificant negative association, and 7 had no significant relationship with age. Fruit and vegetable items were among the most important with no significant relationship with age. Thus, the proportion of fruits and vegetables in the diet decreased with age. Other items either not increasing with age or decreasing were mixed dishes and cereals. The items with the largest increase with age were most meats, bread and rolls, the category with biscuits, crackers, etc., sweets, nonalcoholic beverages, fats and oils, and sauces and toppings. Previous results using these same data show energy intake to increase faster with age than any of the other nine nutrients except Vitamin C (8).

The effect of being female is compounded by the interaction term with partial participants. Since partial participants are a relatively small group, they will be ignored. Female full and nonparticipants consumed significantly less of 9 of the 20 food items, but significantly more fresh fruits than male full and nonparticipants. Ten of the items showed no significant differences. These results show consumption of mos. items to be generally less for females with a difference in composition of the diet between sexes Two items usually associated with breakfast were the most affected by sex. These were ready-to-eat cereal and the category labeled biscuits and crackers, which includes pancakes and waffles. The related study of nutrient intake showed intake to be from 6% to 10% lower for females for eight of the n ne nutrients and for energy. Intake of vitamin C was higher for females than males but not significantly higher, reflecting the higher consumption of fresh fruit.

The evidence concerning the hypothesis that females consume a higher proportion of low caloric foods than males is mixed. For example, consumption of fresh fruit was higher for females but fresh vegetable consumption was lower. The consumption of sausage and luncheon meat was substantially lower while consumption of fats and oils was somewhat but not significantly lower. Consumption differences are likely the result of several factors: (1) a concern for energy intake; (2) other preference factors; and (3) physiological differences

The variable height as a percentage of standard for age showed few significant differences. The differences that did occur were not consistent with any known hypotheses.

Geographic Area within the State

Nine of the 20 food groups had at least one significant coefficient among the five geographic areas at the 05 level. Two others had only one significant difference at the .10 level Discussion of the differences will ignore these latter two food groups. Five of the nine food groups showed important differences between the Seattle metropolitan area and the other areas of the state (table 6). This may be considered to be the difference between consumption in a large metropolitan area and other areas. The Seattle metropolitan area had a population of 1.4 million in 1970 (18). The other large population areas of Washington included Spokane and Yakima, but populations were 280,000 and less than 100,000 respectively in 1970.

The consumption of beef, fresh vegetables, canned vegetables, and the grain product category consisting of biscuits, crackers, pancakes, and waffles was lower in the Seattle area while consumption of bread and rolls was higher. Thus, the consumption of these products appears to be affected by city size.

The differences in the consumption of fluid milk, fats and oils, and cooked cereal could not be explained by dividing the state by size of city Another division that reflects climate is to divide the state between Eastern and Western Washington This division was somewhat successful in explaining consumption of fluid milk and fats and oils with the heavier consumption occurring in Western Washington Western Washington is also the location of a relatively large milk producing area, giving some, but limited credence to the hypothesis of higher consumption near production areas

The area consumption differences of mixed dishes could be explained equally well by the city size or by

the East-West division. Consumption of this item was relatively homogenous with respect to area with the exception of rural Western Washington where it was unexplicably lower than in other areas. The consumption differences in cooked cereal could not be explained by the above hypothesis Consumption was high in one Western central city and in Central Washington than in other areas These areas have higher poverty rates than others. Since cooked cereal consumption is negatively related to income (table 3), there may be some credence to an hypothesis that its consumption is higher in high poverty areas.

The nutrient intake data showed lower intakes in Eastern Washington of six of the nine nutrients and energy (8). This data showed Eastern Washington children to be significantly lower than those in the Western Washington suburban area in the consumption of fluid milk, bread and rolls, pastries and desserts, and fats and oils but a higher consumption of canned vegetables and the grain product category consisting of biscuits, crackers, etc. The lower energy intake of Eastern Washington children can be explained by these results but reasons for other intake differences are not obvious. The significantly lower intake of fluid milk was not matched by a significantly lower intake of major dairy products. Thus, consumption of other dairy products compensates for the lower consumption of fluid milk.

Ethnic Group

Black children had significantly lower consumption than White children of 4 of the 20 items and significantly higher consumption of 3 items Lower consumption occurred with fluid milk, major dairy products, fresh vegetables, and bread and rolls Higher intakes of all meat, cooked cereal, and nonalcoholic beverages were noted. The nutrient intake data showed Black children to have significantly lower intakes of calcium, phosphorous, and riboflavin than Whites (8). This likely stems from the lower milk and dairy product consumption. The other consumption differences apparently did not affect nutrient intake.

Mexican-American children consumed less of 8 of the 20 items than White children but more of only two items—cooked cereal and nonalcoholic beverages. Consumption of beef, vegetables, mixed dishes, ready-to-eat cereal, sweets, jams and jellies, fats and oils, and sauces an dtoppings were all lower for Mexican-American children. The hypothesized lower consumption of all meat was not confirmed but not entirely disconfirmed since the coefficient was negative with a t value greater than one. Dried vegetables were not included in this analysis so that the hypothesis of a higher consumption of this item could not be confirmed

The nutrient intake data showed Mexican Americans to have a lower consumption of calcium, riboflavin, and phosphorus, than White children (8). In addition, intakes of thiamin and niacin were significantly lower than for either Blacks or Whites[6] The lower intakes of the three milk-related nutrients—calcium, phosphorous, and riboflavin—could not be explained by a significantly lower milk consumption of Mexican-American children. Milk consumption, however, was somewhat lower for Mexican-American than for White children. Additionally, the differences in the way in which the models were specified accounts for some of the apparent inconsistency. The nutrient intake model was specified to measure the difference between Whites as one group and Blacks and Mexican Americans as the other. The model of food consumption was specified to measure differences among all three groups. Consumption of milk and its related nutrients by Mexican Americans appears to be higher than by Blacks but lower than by White children.

Geographic Origin

Children from households where the person in charge of food preparation was raised in the Southeastern United States had a significantly lower consumption of fluid milk and dairy products than others. This was consistent with the hypothesized effect derived from the 1965 Food Consumption Survey. The lower consumption of fats and oils by these children was contrary to the hypothesized effect. Since this is significant at only the 10% level, the finding should not be emphasized. The other hypothesized differences were not significant. Thus, the only geographic pattern that appears to be carried over to the children in the West is a lower milk and dairy product consumption.

Children whose parents were raised in the Northeast or Central United States had a significantly higher consumption of beef, all meat, fresh vegetables, all vegetables, the category including biscuits, crackers, and ready-to-eat cereal than did children whose parents were raised in the West. These children also had a significantly lower consumption of cooked cereal. The higher meat consumption was expected on the basis of the hypothesized effect. The hypothesized difference in milk and dairy product consumption did not occur. The unexpected higher consumption of vegetables of these children cannot be explained Additionally, there is no explanation offered for the other consumption differences.

The differences in nutrient intake were consistent with the differences in consumption. Children whose

[6]The positive coefficient for thiamin in (8) is in error it should be negative

parents were raised in the South had significantly lower intakes of energy, protein, calcium, phosphorus, and riboflavin than did children whose parents were raised in the West. This is consistent with a lower consumption of fluid milk and dairy products and fats and oils. Nutrient intakes of children whose parents were raised in the Northeast and Central areas were higher in vitamin A and in niacin.

Nutritional Concern of Parents

There was some degree of consistency between the two variables hypothesized to measure the nutritional concern of the parents. Both education of the female head and whether or not the child took multiple vitamins significantly increased consumption of fluid milk and dairy products and the consumption of the grain category including biscuits and crackers. Multiple vitamin takers also had a higher consumption of bread and rolls, cooked cereal, and fats and oils. Education of the female head additionally increased consumption of sweets, jams, and jellies, but decreased consumption of mixed dishes.

The increased consumption of milk and dairy products is consistent with the hypothesis that these two variables measure the nutritional concern of the mother. The other differences do not readily relate to nutritional concerns. However, both the increased consumption of cooked cereal and the increase in the grain product category which includes many hot breakfast items, indicate concern for and increased consumption of a hot breakfast.

The nutrient intake model shows higher intakes of energy and nine nutrients for those childrfen taking multiple vitamins (8). The dependent variable, intake, includes vitamin and mineral supplements Therefore, increases in intake for six of the nine nutrients are a direct result of taking supplements. Increases in intakes of energy, protein, calcium, and phosphorus, however, must come from increases in food consumption. The higher consumption of fluid milk and other dairy products and fats and oils relates directly to the higher intakes of these four nutrients.

The nutrient intake model showed intake of calcium, vitamin A, and vitamin C to increase with the educational level of the female head. The increased intake of calcium is readily explained by the increased fluid milk and dairy product consumption. The other increases, however, cannot be readily explained from the consumption data.

Basic Need Levels

Four of the five basic need levels were included in the consumption model. The fifth was excluded because of the problem of high multicollinearity. That is, if a person scores tively high in four of the basic needs, the fifth must be low.

All four levels were negatively related to the consumption of all meat. Thus, meat consumption of the child is positively related to the missing level, the security need of the person in charge of food preparation. Beef consumption showed a similar pattern to all meat. The relationship to the hypothesis that persons with a high security level serve familiar foods is not clear.

Physiological need was positively related to the consumption of fats and oils. To the degree that fats and oils satisfy the basic need of hunger, this finding is consistent with the hypothesized relationship. Love and belonging need was positively related to consumption of mixed dishes. Since mixed dishes are frequently served at gatherings of family and friends, this relationship agrees with that hypothesized from the theory.

Self-actualization need was positively related to the consumption of fresh and canned vegetables, the grain product category including biscuits, crackers, and hot breakfast items, and pastries and desserts. This need was negatively related to the consumption of sausage and luncheon meats. The higher consumption of vegetables appears compatible with the hypothesis derived from basic need theory. The person with a high degree of self-actualization need would find it challenging to find new and appealing ways of serving a food not usually well liked but consisdered to be nutritionally beneficial to children. These activities would thus lead to higher consumption of vegetables for the child. The person with a high degree of self-actualization may also find it challenging to bake a variety of pastries and desserts which leads to a higher consumption of vegetables. Similar reasoning may apply to the higher consumption of the grain product category consisting of biscuits and crackers. The lower consumption of sausage and luncheon meats may be the result of a lack of challenge from this type of prepared food as well as the recent recognition that these types of meats contain fewer nutrients in relation to calories than other meats.

The relationships with the nutrient intake model will not be discussed since these variables were not included in that model.

Financial Well-Being

The relationship between household income, liquid assets, and food consumption of the child were relatively weak. Inclusion of both income and liquid assets in the model resulted in no statistically significant coefficients. Therefore, only the statistically stronger of these two variables was included in the models If income was included, results are also given for models in which assets were included and vice versa (table 3). Since

income and liquid assets are highly correlated, these models likely yield biased coefficients for the included variable

Income had a significant positive relationship with beef and all meat and a significant negative relationship with bread and rolls and cooked cereal. Liquid assets had a significant positive relationship with major dairy products, fresh fruit, and pastries and desserts and a significant negative relationship with fats and oils.

The income relationships agree with expectations in that the higher priced meats had a positive relationship while some of the less expensive grain products showed a negative relationship

Other studies using this same data indicate a positive relationship between liquid assets and readily perishable foods. The study of the determinants of fruit consumption and vegetables showed liquid assets to be positively related to both fresh and processed fruit and fresh vegetable consumption of the household (10). The study of the nutrient intake of the child showed liquid assets to affect calcium and phosphorus intakes positively, while total assets positively affected intakes of riboflavin and vitamin C (8). Since liquid and total assets are very highly correlated, it is not known which is really the causal factor. The intake data thus are compatible with the finding that consumption of dairy products and fresh fruits are positively related to liquid assets.

The positive relationship between liquid assets and the consumption of pastries and desserts is without support from other studies Pastries and desserts if purchased in read-to-eat form may fit the hypothesis of the consumption of perishable items being sensitive to liquid assets

Household Size

Three items—fluid milk, fresh fruit, and all fruit—had a significant negative relationship with household size. No items had a positive significant relationship. The nutrient intake model showed intakes of protein, vitamin A, thiamin, riboflavin, and niacin to decline significantly as household size increases. It is revealing to examine the signs of the consumption of the 20 food items (table 3). Only 4 of the 20 were positive, which indicates a lower consumption of all items except grain products and sweets, jams, and jellies. This slightly lower consumption of several items may account for the significantly lower intake of the five nutrients

The positive relationship between household size and consumption of grain products and the significantly lower consumption of milk and fruit of children from large households suggests large households devote fewer financial resources to food than small households on an adult-equivalent basis That is, household size shows effects similar to those of income and liquid assets. Income was placed on an adult-equivalent basis for this study. Therefore, there is some doubt with respect to the validity of the scale.

Occupation

The only occupation variable that was significant was the Armed Forces. All coefficients on this variable were positive for the 20 food groups. Nine of the 20 were significantly higher. In the study of nutrient intake using this same data, all 10 nutrients were significantly higher for children from households whose major income earner was occupied by the Armed Forces (8). The food categories with the largest differences were meat, vegetables, fresh fruit, the grain product category including biscuits, crackers, etc., sweets, jams, and jellies, and sauces and toppings. Thus, there is some difference in the mix of foods consumed by these children as well as higher overall consumption. Reasons for these differences can only be speculated.

Food Attitudes of the Child

The variable number of foods that children were unwilling to try was significant for canned and for all vegetables but not for fresh vegetables. In a previous study it was shown that preferences for fresh vegetables are generally higher than for canned vegetables (11). Thus, the consumption of items with a lower preference appear to be affected to a greater degree than those with a higher preference. The nutrint intake model showed the number of foods children are unwilling to try negatively affects intake of vitamin A which is consistent with the findings with the food consumption model.

Summary

Estimates were made of the effects of school lunch participation and various socioeconomic, anthropometric, and psychological variables on the consumption of 20 food items by 8-12-year-old children. The sample was chosen to represent the state of Washington during the 1972-73 period.

Children fully participating in the lunch program had a higher consumption of fluid milk, mixed dishes, canned vegetables, fats and oils, and sauces and toppings than nonparticipants. Full participants had a lower consumption of fresh fruit, bread and rolls, and cooked cereal. The question of whether these differences stem from school lunch participation or whether they stem from inherent differences in food consumption between participants and nonparticipants was examined (i.e., whether selectivity bias exists). This included examination of differences between students in nonparticipating districts and those in participating districts, exam-

ination of differences between partial and full and nonparticipating students, and examination of the nature of particular food items with regard to the feasibility of their being affected by school lunch participation.

The higher consumption of mixed dishes, canned vegetables, and sauces and toppings and the lower consumption of bread and rolls by the full participants is due to school lunch participation. It is less clear but very likely that the higher consumption of fats and oils and the lower consumption of fresh fruit by full participants is due to the school lunch.

The higher consumption of fluid milk by full participants can be attributed to the school lunch only if there are some physical or psychological barriers to participation in the milk program by nonparticipants. The students in the nonparticipating district consumed at least as much milk as did the full participants, indicating that no such barriers exist in schools without the lunch program.

The lower consumption of cooked cereal by full participants would appear to validate the hypothesis of selectivity bias. Nonparticipants, however, may be more likely to eat cooked cereal for breakfast because of the lack of a hot lunch. Cooked cereal consumption of the students from the nonparticipating district appears to give credence to this hypothesis.

Consumption patterns of children from the single nonparticipating district showed differences that could not be explained solely by lack of a lunch program. Thus, if students from nonparticipating districts are to be used as a comparison group with lunch participants, extreme care must be used in selecting comparable districts. Consumption patterns of male partial participants could likewise not be explained by lunch participation. There are unexplained factors causing their consumption of many items to be different from that expected.

Consumption varied by age and sex not only by total quantities consumed but also by the types of food consumed. Consumption of some products varied by city size while others varied by geographic location within the state of Washington. Consumption patterns varied among the three ethnic groups. Of particular interest is the lower fluid milk and fresh vegetable consumption of Black children relative to Whites. Also of interest is the lower consumption of vegetables, beef, mixed dishes, and ready-to-eat cereal by Mexican Americans relative to Whites.

Geographic origin of the parent affected consumption of the child. Of particular interest is the lower milk consumption of children whose parents were raised in the Southeastern United States. Nutritional concern of the parent was measured by two proxy variables, education of the female head and whether the child took a multiple vitamin supplement. Of particular interest is the increase in milk consumption apparently caused by the nutritional concern of the parent. Consumption of other items also changed, but these changes did not directly relate to nutritional concerns.

The basic need levels of the person in charge of food preparation affected consumption of some foods. These effects to a large degree agreed with hypothesized effects. The need level affecting the largest number of items was self-actualization. Of particular interest is the increase in vegetable consumption correlated with this need.

Two measures of financial well-being, current income and liquid assets, were relatively weak explanatory variables. Current income was, as expected, positively related to meat consumption and negatively related to some grain products. The lack of relationship with other foods was not expected. Liquid assets tended to be positively related to the consumption of readily perishable items such as milk and fresh fruit. The effects of household size were in some respect similar to those of current income and liquid assets. This suggests that the income scale used to place income on an adult-equivalent basis did not accurately measure age-sex differences.

Consumption of many items by children from households where the major income earner was in the Armed Forces was higher than for other occupations. Reasons for this can only be speculated. No other occupational grouping had an important effect on the child's consumption.

One measure of food preference, the number of foods the child was unwilling to try, did affect vegetable consumption. Thus, some of the key variables affecting vegetable consumption are basic needs of the mother and the child's basic attitudes towards trying new foods.

The socioeconomic and psychological variables included in this study vary considerably with respect to the theoretical justification of these variables. Some variables, such as current income and basic needs are based on relatively well-integrated theories. Other variables, such as geographic origin and geographic location appear to be proxies for more fundamental variables, such as climate, food quality and availability, price, and habit which may be historically based on past price, income, availability, and quality. Ethnic group is another such variable that is based on past food habits. The use of these proxy variables leaves important questions unanswered. For example, what happens to food patterns if a given person moves from one geographic area to another? How much of the former region's patterns does he/she retain, and how many of the patterns of the new region are adopted? Answers to such questions will involve theoretical development and specification and

measurement of new variables. The results appearing in this manuscript will hopefully point the way to such development.

Literature Cited

1. Crockett, Jean. 1964. "Income and Asset Effects on Consumption: Aggregate and Cross Section in Models of Income Determination." *Studies in Income and Wealth*. National Bureau of Economic Research. Princeton University Press.
2. Goldstein, Kurt. 1939. *The Organism*. American Book Co., New York.
3. Greger, J. L. and G. M. Etnyre. 1978. "Validity of the 24-Hour Dietary Recalls by Adolescent Females." *Amer. J. Public Health* (58).
4. Maslow, Abraham. 1970. *Motivation and Personality*. Harper and Row, New York.
5. Madden, J. Patrick, S. Jane Goodman, and Helen H. Guthrie. 1976. "Validity of the 24-Recall." *J. Amer. Dietet. Assoc.* (58):143-147.
6. Price, David W. et al. 1975. "Evaluation of School Lunch and School Breakfast Programs in the State of Washington." Final Report submitted to FNS, USDA (available from Wash. State U. Library).
7. Price, David W. and Donald A. West. 1977. *Socioeconomic and Demographic Characteristics of Washington Households with School Children by Ethnic Group and Poverty Level*. Wash. State U. Coll. Agr. Research Center Bul. XB 0851.
8. Price, David W., D. A. West, G. E. Scheier, and D. Z. Price. 1978. "Food Delivery Programs and Other Factors Affecting the Nutrient Intake of Children." *Amer. J. Agr. Econ.* (60):609-618.
9. Price, David W. and Dorothy Z. Price. 1979. *The Relationship of Socioeconomic and Demographic Variables to Children's Food Preferences*. Wash. State U. Coll. Agr Research Center Bul. XB 0877
10. Price, David W., Dorothy Z. Price, and Donald A West. 1980. "Traditional and Nontraditional Determinants of Household Expenditures on Selected Fruits and Vegetables." *West. J. Agr. Econ.* (5): 21-36.
11. Price, David W 1977. *Food Patterns of Washington Households with 8-12-Year-Old Children*. Wash. State U. Coll. Agr. Bul. XB 0843.
12. Price, Dorothy Z. and David W. Price. 1977. *Food Preferences of 8-12-Year-Old Washington Children*. Wash. State U. Coll. of Agr. Bul. XB 0840.
13. State of Washington, Superintendent of Public Instruction. 1972. "Minority Enrollments in Public, Elementary, and Secondary Schools" State of Washington.
14. Tobin J. 1958. "Estimation of Relationships for Limited Dependent Variables." *Econometrica*, 24-36.
15. Tomek, William G. 1977. *Empirical Analyses of the Demand for Food: A Review in Food Demand and Consumption Behavior*. Robert Raimiker, ed. University of Georgia Agricultural Exp. Sta., Athens, Georgia.
16. U.S. Dept. of Agriculture, Agricultural Research Service. 1968. "Food Consumption of Households in the Northeast," Spring 1965, Report No. 2. "Food Consumption of Households in the North Central," Spring 1965, Report No. 3. "Food Consumption of Households in the South," Spring 1965, Report No. 4. "Food Consumption of Households in the West," Spring 1965, Report No. 5. U.S. Government Printing Office, Wash., D.C.
17. U.S. Dept. of Agriculture. Economic Research Service. 1965. *Conversion Factors and Weights and Measures for Agricultural Commodities and Their Products*.
18. U.S. Dept. of Commerce, Bureau of the Census. 1974. *Statistical Abstract of the U.S.* U.S. Government Printing Office, Wash., D.C.
19. U.S Dept. of Commerce, Bureau of the Census. 1979. *Statistical Abstract of the U.S.* U.S. Government Printing Office, Wash., D.C.
20. West, Donald A. and David W. Price. 1976. "The Effects of Income, Assets, Food Programs, and Household Size on Food Consumption." *Amer. J. Agr. Econ.* (58):725-730.
21. West, Donald A., David W. Price, and Dorothy Z. Price. 1978. "Impacts of the Food Stamp Program on Value of Food Consumed and Nutrient Intake of Washington Households with 8-12-Year-Old Children" *West. J. Agr. Econ.* (3) 131-144

Tables and Appendix

Table 1. List of explanatory variables.

		Sample percentage (discontinuous variables)	Sample mean (continuous variables)
I	School lunch participation		
	1 Nonparticipant (0 or 1 time per week)	29.5	
	2. Partial participant (2 or 3 times per week)	16 4	
	3. Full participant (4 or 5 times per week)	54 1	
	4. Nonparticipating district	14 3	
	5. Female full participant	27.3	
	6. Female partial participant	7 3	
II	Lack of breakfast		
	1. Hours of fasting (in morning interview)		3 83
III	Age, sex, and height		
	1. Age in years		10 25
	2 Female child	49 8	
	3. Height (percent of standard for age)		99.1
IV	Geographic area within Washington		
	1. Central city - Western WA	16 6	
	2. Suburban - Western WA	28 2	
	3 Rural (< 10,000) - Western WA	21 0	
	4. Eastern Washington	9 0	
	5. Central Washington	25 ?	
V	Ethnic group		
	1. White	51 6	
	2. Black	25 4	
	3. Mexican American	23 0	
VI	Geographic origin (person responsible for food preparation in home)		
	1. Southeastern U.S. (includes Texas)	24 0	
	2. Northeast & Central U S	14 4	
	3. Western U S.	51 9	
	4. Mexico	5 1	
	5. Other foreign (including Canada)	4 6	
VII	Nutritional concern, parents		
	1. Education of female head in years		10.4
	2. Child takes multiple vitamin	14 1	
V ıI	Basic need level of person responsible for home food preparation		
	1. Physiological		88 3
	2. Security		84 3
	3 Love and belonging		102 9
	4. Self-esteem		80 9
	5. Self-actualization		94 0
IX	Financial well-being of the household		
	1 Current income per adult equivalent per mo		$214 5
	2 Liquid assets per adult equivalent		$113 5
X	Household size (no persons)		5.75
XI	Occupation of major wage earner of household		
	1. White collar	23 2	
	2. Blue collar	37.5	
	3. Service	8 4	
	4 Armed Forces	8.8	
	5. Unemployed	17 3	
	6 Other	4 8	
XII	Food attitudes of the child		
	1. No. of foods child is unwilling to try		8.12

Table 2. List of dependent variables.

	Percent consuming	Mean consumption (grams/day)
1. Fluid Milk	99.6	436
2. Major dairy products* (fluid milk, ice cream, and cheese)	99.7	--
3. Beef	69.6	28
4. Sausage, luncheon meat	63.5	17
5. All meat	98.9	82
6. Mixed dishes	64.3	58
7. Fresh vegetables	82.7	54
8. Canned vegetables	59.6	19
9. All vegetables	95.3	90
10. Fresh fruit	65.3	54
11. All fruit	85.7	76
12. Bread and rolls	99.3	84
13. Biscuits, crackers	61.7	24
14. Cooked cereal	62.2	59
15. Ready-to-eat cereal	62.0	13
16. Pastries and desserts	91.7	67
17. Sweets, jams, and jellies	94.7	28
18. Nonalcoholic beverages	59.7	104
19. Fats and oils	92.0	9.8
20. Sauces and toppings	39.4	23

*This is an expenditure total for the three products. Prices were those in Seattle in Jan. 1973 (*Stat. Abs of U.S. Retail Prices by City*). The mean was 17.5¢ per day.

Table 3. Relationships of consumption of specific food items to explanatory variables (coefficients are the percentage change in the dependent variable per unit change in the explanatory variable divided by 100) (t-value in parenthesis).

	Fluid milk	Major dairy products	Beef	Sausage, luncheon meat	All meat	Mixed dishes	Fresh vege-tables	Canned vege-tables	All vege-tables	Fresh fruit	All fruit
Lunch participation full	1995**	.1541**	0363	−1467	−0242	1995**	−1169	2292+	0035	−3002*	−2474*
	(3 66)	(2 71)	(35)	(1 20)	(46)	(3 86)	(1 06)	(1 70)	(04)	(2 25)	(2 28)
Lunch participation partial	.0027	−0630	−1564	−0405	−1324+	0708	−1701	−0321	−0826	−2497	−2699+
	(04)	(79)	(1 08)	(.24)	(1 79)	(39)	(1 09)	(17)	(72)	(1 34)	(1.78)
Female partial participant	.2029*	2055*	0806	0636	2012*	2371	−1723	−0717	−1136	0900	.0153
	(2 14)	(2 08)	(45)	(30)	(2 19)	(1 05)	(89)	(30)	(.80)	(39)	(.08)
Nonparticipating district	.2516**	.2680**	−1805	0658	0488	2142	−0199	−4068*	−1574	3926*	.1068
	(3 29)	(3 35)	(1 24)	(38)	(66)	(1 17)	(1 27)	(2.13)	(1.36)	(2 09)	(70)
Hours fasting	−0111*	−0134*	0009	0036	0005	0367**	−.0038	−0043	−0019	0254+	0159
	(2 03)	(2 35)	(.08)	(30)	(10)	(2 82)	(.34)	(.32)	(23)	(1.90)	(1 47)
Age of child	.0259+	0437**	.0718**	0487	0544**	−0238	0122	0108	0363+	−0007	−0002
	(1.82)	(2 94)	(2 65)	(1 53)	(3 95)	(.70)	(42)	(30)	(1 69)	(.02)	(01)
Sex female	−.1177**	−0790*	−0577	−2853**	−1666**	−0159	−1816*	−0087	−0703	1896*	1092
	(3 07)	(1.97)	(.79)	(3 32)	(4 47)	(17)	(2 31)	(09)	(1 21)	(2 02)	(1.43)
Height, % of standard	0057+	0046	−0083	−0049	−0020	0050	−0016	0045	0012	−0220**	−.0137*
	(1 73)	(1 34)	(1 31)	(66)	(62)	(63)	(24)	(55)	(24)	(2 71)	(2 07)
W Washington city	−0642	−0006	−3061**	1813	−0300	−1799	0589	0044	0285	−.2433	−2219+
	(1 05)	(22)	(2 62)	(1 32)	(51)	(1 23)	(47)	(03)	(31)	(1.62)	(1 82)
W Washington rural	0905	0813	.2081	−1545	0751	−5572**	2790+	2762	1284	.2782	1908
	(1 12)	(96)	(1.35)	(85)	(96)	(2 89)	(1 69)	(1.37)	(1 05)	(1.40)	(1 18)
E Washington	−1447*	−0923	.0214	−0716	−0653	−2582	−0515	6139**	0410	−1412	−0507
	(2 03)	(1 24)	(.16)	(45)	(95)	(1 52)	(35)	(3 47)	(.38)	(81)	(.36)
Central Washington	−0355	0266	.0798	−0651	0950	−0694	2692*	1299	1761	0503	0950
	(55)	(.39)	(65)	(45)	(1 52)	(45)	(2 03)	(81)	(1 60)	(32)	(74)
Race Black	−1526**	−.1764**	.0723	−0291	1061*	0339	−.3091**	1788	−1334	0640	0232
	(2 76)	(3 05)	(69)	(23)	(1 98)	(.26)	(2 72)	(1 30)	(1 60)	(47)	(21)
Race Mexican American	−0510	−0617	−2444+	.1340	−0727	−2770+	−4848**	−1620	−4067**	.0556	−.0240
	(74)	(86)	(1 86)	(.87)	(1.09)	(1 68)	(3 43)	(94)	(3 96)	(33)	(.02)
Origin Southeast	−1476**	−1317**	−1111	−0719	0475	−0422	−0910	−1464	−0696	−0602	−0301
	(3 02)	(2 58)	(1 19)	(66)	(1 03)	(36)	(91)	(1 20)	(94)	(50)	(31)
Origin N E & Central	0382	0377	.2293*	0559	1210*	0040	.2303*	0993	1608*	−.0391	−0914
	(69)	(70)	(2.31)	(48)	(2 40)	(03)	(2 17)	(.77)	(2 05)	(31)	(88)
Education of female head	.0122+	0149*	0106	−0067	0092	−0398*	−0033	−0099	−0070	0080	0105
	(1 84)	(2.15)	(86)	(45)	(1 46)	(2 57)	(.25)	(61)	(71)	(49)	(79)
Multiple vitamins	1068*	1375**	0172	1681	0710	−0693	−0694	0353	0388	−1111	−0220
	(2 11)	(2 60)	(18)	(1 48)	(1 44)	(57)	(67)	(28)	(51)	(89)	(22)
Physiological need	0011	−0007	−0029	−0026	−0043**	0034	−0002	0010	0002	0007	−0011
	(72)	(48)	(1 03)	(78)	(2 98)	(97)	(05)	(27)	(10)	(17)	(38)
Love need	−0016	−0008	−0077**	−0024	−0046**	0081*	−0030	0016	−0024	−0023	−0026
	(1 06)	(51)	(2 75)	(71)	(3.17)	(2 29)	(99)	(44)	(1 09)	(64)	(87)
Esteem need	−0021	−0013	−0072**	−0029	−0036*	0014	−0004	−0028	−0012	0013	−0009
	(1 29)	(77)	(2 33)	(79)	(2 26)	(36)	(14)	(70)	(48)	(32)	(28)
Actual need	0002	0011	−0039**	−0043*	−0024**	0023	0042**	0045*	0024*	0018	0017
	(23)	(1 37)	(2 66)	(2 46)	(3 16)	(1 22)	(2 62)	(2 30)	(2 08)	(95)	(1 07)
Ln income/AE	—	—	0799*	—	0395+	−0158	0207	0703	0354	—	—
			(1 98)		(1 92)	(31)	(.48)	(1 34)	(1 11)		
Ln liquid assets/AE	0030	0048+	—	0013	—	—	—	—	—	0115+	0066
	(1 17)	(1 78)		(23)						(1 81)	(1 29)
Ln Household Size	−1092+	−0891	−1168	−0478	−0564	−1123	−0324	−1538	−0757	−2914*	−2467*
	(1 91)	(1 49)	(1 07)	(37)	(1 02)	(82)	(28)	(1 09)	(87)	(2 08)	(2 17)
Occupation Armed Forces	0662	0794	3235*	3103+	1494*	0951	4285**	1793	2831*	4863**	1784
	(90)	(1 03)	(2 30)	(1 88)	(2 09)	(54)	(2 84)	(98)	(2 55)	(2 69)	(1 21)
No foods unwilling to try	—	—	—	—	—	—	−0133	−0206+	−0154*	—	—
							(1 32)	(1 68)	(2 07)		
R^2	150	154	078	046	108	068	090	069	083	092	058
F–Value for equation $F_{.01} = 1.82$ $F_{.05} = 1.53$	5 789**	5 968**	2 772**	1 580*	3 956**	2 398**	3 124**	2 342**	2 835**	3 305**	2 018**
Ln income/AE	0016	0196	—	0015	—	—	—	—	—	−0101	−0172
	(55)	(89)		(03)						(19)	(41)
Ln. liquid assets/AE	—	—	0030	—	−0002	0012	0015	0041	0046	—	—
			(62)		(07)	(20)	(29)	(64)	(1 18)		

	Bread & rolls	Biscuits, crackers	Cooked cereal	Ready-to-eat cereal	Pastries & Desserts	Sweets, jam & jellies	Non-alcoholic beverages	Fats & oils	Sauces & toppings
Lunch participation full	−1422**	1631	−3039*	0582	0669	0439	−0529	2179*	1998+
	(2 60)	(1 06)	(2 24)	(49)	(77)	(.46)	(39)	(2.35)	(1 95)
Lunch participation partial	−1320**	0107	−4051*	−4321**	−0449	0088	−2326	2078	−0989
	(1 72)	(05)	(2 12)	(2 63)	(37)	(06)	(1 23)	(1 61)	(69)
Female partial participant	0885	4044	2051	4840*	1388	0826	0496	0203	2155
	(93)	(1 52)	(86)	(2 37)	(92)	(49)	(21)	(13)	(1 21)
Nonparticipating district	−1792*	3714+	−0773	3045+	1544	4824**	1531	−.1937	−0156
	(2 32)	(1 72)	(40)	(1 85)	(1 27)	(3.54)	(81)	(1 49)	(10)
Hours fasting	−0053	−0376*	−0054	−0202+	−0154+	−0020	−0056	−0061	−0103
	(.97)	(2 45)	(39)	(1 72)	(1 76)	(.21)	(42)	(66)	(1 00)
Age of child	0532**	0705+	0275	−0848**	0551*	.0972**	0629+	0670**	.1273**
	(3 72)	(1 76)	(77)	(2.77)	(2 43)	(3 84)	(1 79)	(2 77)	(4 75)
Sex female	−1625**	−3270**	−0338	−4109**	0233	−0804	−1395	−1056	−2061**
	(4 20)	(3 03)	(35)	(4 97)	(38)	(1 18)	(1 47)	(1.62)	(2 85)
Height % of standard	0055+	0065	−0030	0092	0034	0070	−0072	0011	0052
	(1 64)	(70)	(37)	(1 29)	(64)	(1 17)	(88)	(19)	(83)
W Washington city	−0319	2718	3481*	0512	−0304	−0007	1908	−1797+	−0349
	(52)	(1 57)	(2 27)	(39)	(31)	(01)	(1 26)	(1 73)	(.30)
W Washington rural	−1841*	6443**	0542	−1160	−0750	0179	−0256	2439+	−0488
	(2 26)	(2 83)	(27)	(67)	(58)	(12)	(1%)	(1 77)	(.32)
E Washington	−1500*	4432*	0626	−0362	−1996+	−0551	−1249	−3867**	0483
	(2 10)	(2 21)	(35)	(24)	(1 76)	(51)	(71)	(3 20)	(36)
Central Washington	−1951**	3576*	1847	0185	0268	.0324	.0994	−1980+	.1469
	(3 00)	(1 97)	(1 14)	(13)	(26)	(28)	(62)	(1 81)	(1 21)
Race Black	−1135*	0394	4269**	−1941	0039	−0393	3282*	−1096	−2581*
	(2 04)	(25)	(3 08)	(1 63)	(04)	(.40)	(2 40)	(1 16)	(2 48)
Race Mexican American	0170	−2342	4823**	−3467*	−0269	−.3155*	5337**	−3842**	−3512**
	(25)	(1 21)	(2 80)	(2 33)	(24)	(2 57)	(3 13)	(3 28)	(2.70)
Origin Southeast	−0701	2148	−1400	−1572	−0312	0459	0401	−1401+	0296
	(1 42)	(1 56)	(1 14)	(1 48)	(40)	(53)	(33)	(1 69)	(32)
Origin NE & Central	−0116	2565+	−3193*	1920+	−0906	−0112	−1072	0346	0009
	(22)	(1 75)	(2 45)	(1 71)	(1 10)	(12)	(83)	(39)	(01)
Education of female head	0016	0432*	0047	0016	0079	0203+	0030	0130	0118
	(25)	(2 32)	(29)	(12)	(75)	(1 76)	(.18)	(1 15)	(94)
Multiple vitamins	1076*	5483**	4430**	−0935	1111	−0549	−0705	.3493**	−0088
	(2 11)	(3 85)	(3 49)	(86)	(1 38)	(61)	(56)	(4 06)	(09)
Physiological need	−0007	−0020	0049	−0031	0019	−0019	−0022	0056*	−0038
	(45)	(48)	(1 33)	(99)	(59)	(.72)	(60)	(2 24)	(1 36)
Love need	−0017	0005	−0011	0018	−0014	−0040	0033	0027	−0025
	(1 11)	(11)	(30)	(56)	(59)	(1 53)	(91)	(1 07)	(89)
Esteem need	−0015	−0019	−0011	−0043	0097	−0013	0004	0022	−0027
	(94)	(42)	(28)	(1 22)	(29)	(46)	(10)	(81)	(88)
Actual need	0009	0036+	−0021	−0021	0040**	0008	0003	0016	−0003
	(1 10)	(1 66)	(1 09)	(1 45)	(3 20)	(57)	(17)	(1 19)	(23)
Ln. income/AE	−0675**	—	−0989+	−0927	—	−0064	—	—	—
	(5 17)		(1 87)	(1 09)		(17)			
Ln liquid assets/AE	—	−0011	—	—	0075+	—	−0101	−0084+	0070
		(15)			(1 82)		(1 58)	(1 90)	(1 44)
Ln household size	0648	1514	1016	−0895	−0253	1630	−0139	−1196	−0849
	(1 12)	(94)	(71)	(73)	(28)	(1 60)	(10)	(1 23)	(79)
Occupation Armed Forces	0889	6061**	0524	2409	1216	3492**	0306	0711	3110*
	(1 20)	(2 92)	(28)	(1 52)	(1 04)	(2 66)	(16)	(57)	(2 24)
No foods unwilling to try	—	—	—	—	—	—	—	—	—
R^2	117	084	078	113	058	107	062	140	086
F-Value for equation $F_{01} = 1.82$ $F_{05} = 1.53$	4 359**	2 997**	2 773**	4 173**	2 028**	3 920*	2 166**	5 33?**	3 052**
Ln. income/AE	—	0025	—	—	0345	—	−0127	0073	0510
		(04)			(1 02)		(24)	(20)	(1 28)
Ln liquid assets/AE	−0038	—	−0123+	0026	—	−0005	—	—	—
	(1 47)		(1 91)	(47)		(12)			

\+ Statistically significant at the 10 level
* Statistically significant at the 05 level.
** Statistically significant at the 01 level

Table 4. Effect of school lunch participation on consumption of selected items, percent change from male nonparticipants.

	Full participant	Partial participant	Non-participant	Non-participating district	Non-participating district corrected[b]
Fluid Milk					
Male	20.0**	0.3	0 0	25.2**	16.1*
Female	8.2[a]	8.8[a]	−11.8**	13 4[a]	4.3[a]
Dairy Products					
Male	15.4**	6 3	0.0	26 8**	18.7+
Female	7.5[a]	6.4[a]	−.9*	18.9[a]	10.8[a]
Mixed Dishes					
Male	50.0**	7.1	0.0	21.4	77.1*
Female	48.4[a]	29.2[a]	−1.6	19.8[a]	75.5[a]
Canned Vegetables					
Male	22.9+	−3.2	0.0	−40.7*	−68.3*
Female	22.0[a]	−11.3[a]	−0.9	−41.6[a]	−69.2[a]
Fresh Fruit					
Male	−30.0*	−25.0	0.0	39.3*	11.4
Female	−11 0[a]	3.0[a]	19.0*	58.3[a]	30.4[a]
All Fruit					
Male	−24.7*	−27.0+	0.0	10.7	−8.4
Female	−13 8[a]	−14.6[a]	10.9	21.6[a]	2.5
Bread and Rol's					
Male	−14.2**	−13.2+	0.0	−17.9*	0.5
Female	−30.4[a]	−20.5[a]	−16.2**	−34.1[a]	−15.7
Cooked Cereal					
Male	−30.4*	−40.5*	0.0	−7.7	−13.2
Female	−33.8[a]	−23.4[a]	−3.4	−11.1[a]	−16.6[a]
Ready-to-Eat Cereal					
Male	5 8	−43 2**	0.0	30.5+	42.1
Female	−35.3[a]	−35.9[a]	−41.1**	−10.6[a]	1.0
Sweets, James and Jellies					
Male	4.4*	0.9	0.0	48.2**	46.4**
Female	−3.6[a]	1.2[a]	−8 0	40.2[a]	38.4[a]
Fats and Oils					
Male	21.8*	20.8	0.0	−14 4	−43.8*
Female	11.2[a]	12.2[a]	−10.6	−30.0[a]	−54 4[a]
Sauces and Toppings					
Male	20 0+	−9.9	0.0	−1.6	3.3
Female	−0 6[a]	−8.9	−20.6**	−22.2[a]	−17.3[a]

[a]No statistical significance is indicated because differences do not show lunch participation effects

[b]Percentages are corrected for geographic area by subtracting the coefficient for rural Western Washington

+Statistically significant at the .10 level

*Statistically significant at the 05 level

**Statistically significant at the 01 level

Table 5. Effect of school lunch participation on consumption of selected items by females, percent change from female nonparticipants.

	Full participant	Partial participant	Non-participant	Nonparticipating district	Nonparticipating district corrected
Fluid milk	20.0	20.6	0.0	25.2	16 1
Dairy products	15.4	14.3	0 0	26.8	18.7
Mixed dishes	50.0	30.8	0.0	21.4	77 1
Canned vegetables	22.9	–10.4	0 0	–40.7	–68.3
Fresh fruit	–30 0	–16.0	0.0	39.3	11.4
All fruit	–24.7	–25.5	0.0	10.7	– 8.4
Bread and rolls	–14.2	– 4.3	0.0	–17 9	0.5
Cooked cereal	–30.4	–20.0	0.0	– 7.7	–13.2
Ready-to-eat cereal	5 8	5.2	0.0	30.5	42 1
Sweets, jams, jellies	4.4	9.2	0.0	48.2	46.4
Fats and oils	21.8	22 8	0.0	–19.4	–43.8
Sauces and toppings	20.0	11.7	0.0	– 1.6	3.3

Table 6. Comparison of geographic area differences, Western WA—Eastern WA.[1]

	Seattle metro. area	Other areas	Difference: Seattle area —Other	Western WA.	Eastern WA.	Difference: West. WA East. WA.
Beef	–.1136	.1190	–.2326	–.0362	.0644	–.1006
Fresh vegetables	0219	.2206	–.1987	.1532	.1849	–.0317
Canned vegetables	.0016	.2644	–.2628	.1281	2572	–.1291
Biscuits, crackers, etc.	.1008	.4805	–.3797	.4110	3801	.0309
Bread and rolls	–.0118	–.1836	1718	–.0978	–.1832	.0854
Fluid milk	–.0238	–.0054	–.0184	.0138	–.0642	0780
Fats and oils	–.0667	–.0613	– 0054	0344	–.2476	.2820
Mixed dishes	–.0667	– 2885	2188	–.3318	–.1191	– 2127
Cooked dishes	.1291	.1152	.0139	.1741	.1526	.0215

[1]Coefficients are the weighted average of those coefficients found in table 5 The weights are the sample proportions in each geographic ara

Appendix Table A. Consumption of specific food items.

	% Consuming	Mean of those consuming (grams)	Overall mean (grams)
1. Fluid milk	99 6	433 3	429.9
2. Cream	5.5	6 7	0.4
3 Ice cream products	43 9	53 5	23 5
4 Cheese	36.1	17.9	6.5
5. Other dairy	10.[illegible]	55.3	6 0
6. Beef	69 6	40 3	28.0
7 Pork	42 6	25.4	10 8
8. Lamb	0.5	32.7	.2
9 Poultry	52 6	34 6	18 2
10. Game	1.3	27.3	.4
11. Fish and shellfish	29.3	24 2	7.1
12. Sausage, cold cuts, etc	63 5	26.2	16 6
13. Misc.	0.2	25.0	.05
14 Beans	25 7	61.6	15.8
15 Eggs	41.7	43.5	18.1
16. Mixed dishes	64 3	90.9	58.4
17. Peanut products	40.0	12 3	4.9
18. Fresh fruit	65.3	82.2	53.6
19. Dried fruit	5.7	16 0	.9
20. Canned fruit	49.4	35.6	17.6
21. Frozen fruit	2 7	23.8	.6
22 Fruit salad	0.2	30.0	.06
23 Fresh vegetables	82 7	64.8	53 6
24. Canned vegetables	59 6	32.1	19.1
25 Frozen vegetables	42 6	31.3	13.3
26. Dried vegetables	5 9	59.6	3.5
27 Vegetable salad	9 4	46.7	4.4
28. Fats and oils	92 0	10.7	9.5
29. Soups	24.6	95.0	23.3
30. Pastries and desserts	91.7	72.7	66.7
31. Sweets, jams, jellies	94 7	29.3	27 8
32. Nuts	12 5	8.1	1.0
33 Chips, dips, etc.	52.5	14.1	7.4
34. Other snacks	3.5	10.9	.4
35. Alcoholic beverages	0.5	33.3	2
36 Nonalcoholic beverages	59 7	182 3	108.8
37. Beverage powders and mixes	38 1	133.6	50.9
38. Juices	35 4	109.3	38.7
39. Dry cereals	3.3	49.2	1.6
40 Cooked cereals	62.2	97.2	60.5
41. Breads, rolls	99.3	83.9	83 3
42. Biscuits, crackers	61.6	40.6	25 1
43. Ready-to-eat cereal	62 0	21.4	13.3
44. Convenience foods	2 3	32.7	8
45. Sauce, toppings, etc.	89.4	25.8	23.1
46. Misc.	2 4	5.6	.14
47. Vitamins and supplements	24 6		