Intentions, Information, and Convenience: An Empirical Analysis of their Effect on the American Diet and Demand for Meat

Lisa Mancino
e-mail: manc0017@tc.umn.edu

Brian Dietz
e-mail: diet0078@tc.umn.edu

Paper prepared for presentation at the X^th EAAE Congress
'Exploring Diversity in the European Agri-Food System',
Zaragoza (Spain), 28-31 August 2002

Intentions, Information, and Convenience:
An Empirical Analysis of their Effect on the American Diet and Demand for Meat:

Lisa Mancino
PhD Candidate
Department of Applied Economics
University of Minnesota
612-625-0226
manc0017@tc.umn.edu

332D ClaOff
1994 Buford Avenue
St. Paul, MN 55108
U.S.A

Brian Dietz
PhD Candidate
Department of Applied Economics
University of Minnesota
612-625-1783
diet0078@tc.umn.edu

248K ClaOff
1994 Buford Avenue
St. Paul, MN 55108
U.S.A

Abstract

The purpose of this paper will be to develop and present a new approach for examining the demand for meat by incorporating many of the advances in behavioral economics. By providing a closer approximation to how consumers actually behave, doing so should improve upon existing models. Incorporating findings from behavioral studies will also provide a richer theoretical basis to correct for the longstanding problem of endogeniety in cross-sectional studies.

The theoretical model in this study begins with the Becker household production model, where individuals are assumed to maximize utility, subject to their production functions, budget constraint and time constraint. To develop a model that more accurately depicts how individual's make their food choices, this model additionally assumes that individuals 1) use household time to create food, health and relaxation; 2) make their food and nutrient consumption choices on a per-meal basis; 3) are affected by the prospect of immediate gratification, convenience and time delay, and 4) are more affected by these factors as their hunger increases.

Intentions, Information, and Convenience:
An Empirical Analysis of their Effect on the American Diet and Demand for Meat:

Key Words: Meat Demand, Behavioral Economics, Information and Nutrition

Introduction and Problem Statement

Over the past two decades there has been a proliferation in the amount of scientific information substantiating a link between eating a good diet and maintaining good health. From this has sprung an increasing number of national campaigns intended to educate Americans on the importance of a more healthful diet. The success of these campaigns may have contributed to the findings of a 2001 Food Marketing Institute (FMI) study, where nearly 60 percent of sampled shoppers indicated that their grocery purchases were strongly affected by some health concern and 76 percent felt that healthy eating was a better way to manage their health than medication (FMI 2001a, p.7). Not surprisingly, then, the last decade has seen an increase in sales of organic, light, low-fat, and low-salt foods. In the natural food industry[1] alone, there has been an average growth rate of 20-25 percent per year. In comparison, the conventional food market has reported average growth rates of three to five percent per year (Richman, 1999).

Yet while Americans are more aware of the links between diet and health, the rising numbers of dual income and single parent families have made the average family more pressed for time and thus, more willing to pay for greater convenience. Since 1960, the percentage of women working full time has increased over 60 percent. Meanwhile, there has also been an escalation in the amount of dining out, fast food meals, and home meal replacement (FMI 2001b; Senauer et al. 1991, p. 5). As of 1995, Americans were eating nearly 30 percent of their meals away from home, which was an over 80 percent increase from 1977 (Lin, Guthrie, and Frazao, 1999). A potential problem with this escalation is that overall, Americans demonstrate they know very little about the nutrient content of food prepared away from home and regularly underestimate the fat and caloric content of such meals (Kennedy et al, 1999).

Another potential health risk from the increased demand for convenient foods is that they tend to be denser in calories. This is not to say that food made from scratch cannot be high in fat, but that it is more difficult to find healthful foods that are convenient and flavorful. This lack of healthful alternatives at fast food and take out restaurants was cited as the strongest factor that impeded respondents from having a more healthful diet (FMI 2001a, p. 19). To show that this perception is not off the mark, consider an individual who eats a Big Mac, medium French fries, and a medium Coke for lunch. By doing this, she consumes 1250 calories, 54 grams of fat, and 15 grams of saturated fat. For an individual on a 2,000 calorie-a-day diet[2] this one meal would have accounted for almost 63 percent of her daily calories, 83 percent of her recommend fat intake and 60 percent of her saturated fat intake. As such, she would find it difficult to stay within her recommended daily allowance once the nutrients from this meal are added to her calories, fat, and saturated fat consumed at dinner and breakfast. Not surprisingly, while Americans have reduced their overall fat consumption, they have made less progress reducing

---

[1] Natural foods are defined as being produced with minimal processing, free of artificial ingredients, preservatives, and chemicals,

[2] The National Research Council recommends a 2000 calorie-a-day diet for women between 15 to 50 years of age.

the amount of fat in food consumed away from home. In 1995, when only considering food prepared at home, the average American consumed 31.5 percent of her calories from fat. However, when only considering food prepared away from home, the percent of calories from fat rose to 41 percent (Lin, Guthrie, and Frazao, 1999)!

The increased consumption of more convenient foods may be a significant contributor to the dramatic increases in both the incidence and level of obesity among Americans. As of 2000, it was estimated that 56.4% of all Americans were overweight and one in five US adults were obese (Associated Press, 2001). Consequently, there has been a parallel rise in the incidence of diseases highly correlated with poor nutrition and over consumption: cancer, strokes, heart disease and diabetes. With total economic costs of these four diseases conservatively estimated at $70.9 billion per year, this may prove to be a costly trend (Frazao 1999, p. 23). The surgeon general has even predicted that obesity may soon overtake tobacco as the primary cause of preventable deaths (News Service, 2001)

These conflicting trends highlight a striking paradox: While Americans claim to be eating better and improving their understanding of diet and health, they are getting heavier and increasing their risk of suffering from diet related illnesses. The cause of this paradox is still unclear. It may be because Americans just eat too much of everything, where an individual who eats a Big Mac at lunch goes home to eat an oversized salad at dinner. Or, there may be a clear disjoint set between the people who eat poorly and the people who eat healthful foods. Alternatively, it may be that individuals usually try to incorporate their beliefs about healthy eating into their food choices, but due to time constraints, stress, and the need for convenience, must sometimes forego good intentions for more immediate gratification.

This could explain why we continue to see high levels of beef consumption at fast food restaurants, while overall we also see that Americans have shifted from red meat to meats that are lower in cholesterol, such as fish or poultry. According to the 1994-1995 Continuing Survey of Food Intake by Individuals, while 35 percent of all meat consumed was beef, beef accounted for 46 percent of all meat consumed at fast food restaurants. Meanwhile, 85 percent of all respondents claimed that they often or occasionally choose fish and poultry over beef in order to improve their diets.

Conceptual Background

Such situations, where there is an inconsistency between what an individual chooses to do and what she believes she should do, may give rise to self-defeating behavior. For example, someone who continues to smoke even though she is well aware of health problems smoking may cause could be said to be behaving in a self-defeating manner. Similarly, someone who remains sedentary despite his increasing awareness of the health benefits from exercising may not be behaving with his best long-term interests in mind. When it comes to eating healthy foods, there is little reason to suspect that people are any better at sticking to their guns, especially if someone thinks doing so requires spending more money, spending more time, or giving up foods she likes.

Intuitively, we understand how the prospect of immediate gratification can foil our good intentions and lead to self-defeating behavior. For that reason, most people try to avoid grocery shopping on an empty stomach. Empirically, studies have consistently found that both human and animal subjects show that their preferences between two delayed outcomes switch when both delays are increased by an equal amount (Lowenstein and Prelec, 1992). For example, an individual may prefer a hamburger today to a healthy salad tomorrow, but also prefer a healthy salad in 7 days to one hamburger in 8 days. This is known as the common difference effect and can lead to inconsistencies in consumer behavior.

In order to explain this seemingly irrational behavior, discounted utility models speculate that some individuals have bad information, place a low value on their health and future, or simply get higher utility from the unwise behavior, such as eating unhealthy foods. However, these speculations cannot be easily reconciled with concurrent observations that these same individuals are informed, save money for their future and do eat healthy some of the time.

The aim of this study is to provide a model that will explain when and why such inconsistencies occur. This should yield a more accurate depiction of how individuals make their food choices. To that end, this study will specifically address how convenience and the prospect of immediate gratification affect individual food choices. More precisely, it will model how one's demand for convenience changes with hunger, measured as the interval an individual has gone without food. It is hypothesized that after a critical level of hunger, one's demand for immediate gratification increases sharply. This would result in an increased demand for convenient food. Since most fast foods offer more beef byproducts, there is an observed increase in demand for these meats.

Traditional Models of Meat Demand

The majority of studies of meat demand are based on the traditional, neoclassical economic model where the consumer solves:

(1) $$\max_{F,NF} \; U(F, NF)$$

subject to the budget constraint $p_F \cdot F + p_{NF} \cdot NF \leq Y$ where F is a vector of food goods and NF is a vector of non-food goods consumed by the consumer with prices p_F and p_{NF}. Imposing separability of food and non-food goods and meat and non-meat foods results in a system of demand functions $X_m = f(p_F, Y)$ for each of the m different meat items.

Many studies have expanded on this approach to include health status, health information, and other demand shifters but rarely provide a theoretical framework that argues for their inclusion. Moreover, most of the studies aggregate individual meals and food consumed throughout the day, week or year. This aggregation over observations ignores the individuals' level of hunger when they make their food choice, which may result in misspecifying not only the relationship between information and meat consumption but also the effect of income and prices on meat demand. The next and most appropriate research strategy is to develop richer theoretical models to examine food intakes, nutrient or otherwise (Park and Davis, 2001).

The Theoretical Model

The theoretical model in this study begins with the Becker household production model, where individuals are assumed to maximize utility, subject to their production functions, budget constraint and time constraint. To develop a model that more accurately depicts how individual's make their food choices, this model additionally assumes that individuals 1) use household time to create food, health and relaxation; 2) make use of information by using simple heuristics; 3) make their food and nutrient consumption choices on a per-meal basis; 4) are affected by the prospect of immediate gratification, convenience and time delay, and 5) are more affected by these factors as their hunger increases.

Specifically, it is assumes that an individual maximizes his or her utility:

(2) $$\max_{F_m, NF_m, H_m, \Gamma_m, T\ell_m{}^h} U = \sum_{m=1}^{M} U(F_m, NF_m, H_m, T\ell_m{}^h, \Gamma_m;\ \varepsilon^o{}_m,\ \varepsilon^u{}_m)$$

F_m is a K dimensional vector of food consumed at meal m. In this model, individuals not only receive satisfaction directly from food, but also consumption of non-food items (NF_m), healthy leisure time ($T\ell^h{}_m$), and the individual's health status (H_m). It is assumed that individuals make their consumption decisions on a per-meal basis (m) over some finite planning period that ends at M. For example, if the planning period were one day, then M would be the last meal of the day. It is also assumed that individuals get utility from the quality of their leisure time. In this way, leisure time when one is sick yields less satisfaction then when she is healthy. Healthy leisure time is the product of time spent in leisure activities ($T\ell_m$) and the quality of leisure activities $\Omega(H_m)$, which indicates the flow of health services per unit of leisure time (Grossman 1970, Sur 2000). In this framework, a person with perfect health would get one full hour of quality leisure time for every leisure hour. If this person's health were to decline, then she would receive less than one hour of quality leisure time.

(3) $$T\ell^h{}_m = T\ell_m \Omega(H_m)$$

The level of satisfaction received from these variables is indirectly affected by the following factors: an individual's observable exogenous factors, such as socio-demographic characteristics ($\varepsilon^o{}_m$); her exogenous unobservable characteristics, such as taste ($\varepsilon^u{}_m$); and her endogenous level of hunger at meal m (Γ_m), which decreases with the amount of food she consumed at the previous meal (F_{m-1}), and increases with the amount of time between meals (I_m) such that :

(4) $$\Gamma_m = \Gamma(I_m, F_{m-1}).$$

It is assumed that the indirect affects of hunger on the marginal utilities from each argument are as follows: Increasing hunger increases the utility received from food and leisure time, but also leads to temporary discomfort. The rationale behind this is that, as one becomes hungrier, she may receive more enjoyment from food, but may also experience health problems, such as low blood sugar, fatigue, and irritability. These increasing ill health effects will increase one's sensitivity to time delay, and eventually, demand for convenience. In this framework, greater convenience is modeled as a reduction in time spent producing food. Since the total amount of time is finite, leisure time is negatively related to time spent preparing food. Thus, increasing hunger leads to an increased demand for less preparation time in favor of more leisure time.

The first constraint, the individuals health production function (H_m), defines the links between health inputs: nutrients (n_m); time spent in health pursuits, such as exercising and becoming more informed about good nutrition (Th_m), and hunger (Γ_m). The health production function is also affected by exogenous observable characteristics, such as gender, age and income ($\varepsilon^{oh}{}_m$) and exogenous unobservable factors ($\varepsilon^{uh}{}_m$) such as genetic endowment. This function is assumed to be continuous, strictly concave, twice continuously differentiable and exhibit positive and diminishing marginal utilities with respect to each argument except hunger, and the nutrients that should be consumed in moderation[3]. In hunger, the production of health is increasing (or neutral) up to some hunger level Γ^*. Once an individual surpasses this critical level, the ill health effects of denying the body nutrients begin to have a negative effect on the production of health until some maximum level of hunger $\underline{\Gamma}$, after which the individual will die of hunger. As such, the health production function is defined as follows:

(5) $$H_m = h(n_m, Th_m, \Gamma_m;\ \varepsilon_m{}^{oh},\ \varepsilon_m{}^{uh})$$

The purpose of including the hunger variable is to model not only the importance of the amount and number of nutrients consumed, but also the timing of which they are consumed. Typical health production functions only analyze the amount and number of nutrients consumed in a given observation period. Yet excluding the timing of consumption is tantamount to assuming that the timing of consumption is irrelevant. As such, an individual who eats nothing for six days, and gorges himself on 7 breakfasts, 7 lunches and 7 dinners on the seventh day would have the same estimated health production as an individual who spaced these meals out over 7 days.

The nutrient intake of individuals is decided by a perceived mapping function ($\hat{\tau}$), which translates the foods consumed at F_m into nutrients, such as grams of fat, protein, carbohydrates, and cholesterol. How accurate this mapping function is depends on the individual's knowledge (η_m), her stock of human capital (E_m) and where the individual procured the food (FS_m). This mapping function uses a Lancaster framework, where (η_m) dictates the individual's perception of how much a specific characteristic flows from each food item. For example, an individual who is well aware of the health risks linked with consuming too much fat will be better able to determine the amount of fat in a food item than someone who is unaware of these links. Also, it is assumed that an individual will be better able to assess the nutrient content of food prepared at home than food purchased away from home. Thus, where she purchased her food affects her perception of nutrient content.

(6) $$n_m = F_m \hat{\tau}_m$$

(7) $$\hat{\tau}_m = \tau(\eta_m; E_m, FS_m)$$

[3] According to USDA recommendations, individuals should limit intake of fats, sugar, cholesterol and sodium.

The second constraint the individual faces is the food production function, which is assumed to be continuous, strictly concave, twice continuously differentiable and exhibit positive and diminishing marginal utilities with respect to each argument. This model assumes that kth food item produced by the individual at the mth meal is a function of purchased inputs (x_{km}) and time spent preparing food (TF_{km}), given the individuals stock of human capital (E_m). As such, the individuals per meal food production function is defined as follows:

(8) $$F_{mk} = F(\{x_{mkj}\}_{j=1}^{J}, Tf_{mk}; E)$$

The individual's must also consider their time and budget constraints.

Solving the First Order Conditions will yield the following per-meal reduced form demand functions for the jth food inputs at the mth meal:

(9) $$X_{mj}^{*} = D^{X_{mj}}(P_X,\ P_{NF},\ kP_Q,\ w,\ A,\ E,\ \eta,\ \varepsilon^{o},\ \varepsilon^{u},\ I_m,\ F_{m-1}, FS_m)$$

Where ε^{o} and ε^{u} are observable and unobservable exogenous characteristics.

Data and Assumptions

The data to be used comes from the USDA's 1994-1996 Continuing Survey of Food Intake by Individuals (CSFII 1994-1996) and the companion Diet and Health Knowledge Survey (DHKS). The purpose of the CSFII is to monitor food use and consumption patterns in the U.S. and provide data on food and nutrient intake. This data set contains detailed information on an individual's food intake, and her personal and household characteristics, such as age, level of education, sex, weight, height, race, income, education level of family members, and family size. The DHKS is the first national survey of individuals' dietary attitudes and nutrition knowledge that can be linked to the nutrient intakes. It provides information on peoples' attitudes and knowledge about dietary guidelines and their ability to put this knowledge into practice. It also provides information on one's perceived adequacy of her own food and nutrient intake.

The CSFII data were collected via in-person interviews, where survey respondents were asked to recall their food intake over the last 24-hours This was done on 2 non-consecutive days spaced 3-10 days apart. In each CSFII household, the DHKS was administered to 1 adult over 20 years old who was identified as the main meal planner and also reported at least one day of food intake. This survey was administered over the telephone 2 to 3 weeks after the collection of CSFII data. For the purposes of this study, only individuals who also answered the DHKS will be included in the econometric analysis to maintain a clear linkage between one's information and beliefs and her nutrient intake. The survey was a stratified, multistage area probability sample that over-sampled low-income families. The use of sampling weights is important because it compensates for variable probabilities of selection, different response rates and potential deficiencies in the sampling frame and are designed to yield estimates of the actual population which allows inferences drawn from sample estimates to be applied to the population.

Results from the 1994-96 CSFII indicate that beef is still king of meats despite the increased concern and heightened awareness to the health risks of red meat. The alternative and healthier meats, primarily poultry, are a close second. Consumers still eat more meat at home than away from home--35 percent of all meat was consumed away from home--but percentages vary across different meats. Additionally, expenditure data seems to indicate that the amount of food consumed away from home and at home are very close. In the CSFII 1994-96 time period, roughly 45 percent of the food expenditures were for food away from home, an increase from roughly 35 percent in 1970 (Putnam and Allshouse, 1997).

The 1994-96 CSFII data indicate that meat is eaten more often at home than away from home (65 percent of all meat is eaten at home) and less than one quarter of all meat purchased is purchased at fast food and other restaurants. More meat is consumed at lunch (50 percent) than at breakfast and dinner combined (12 and 32 percent respectively). Of the different meat types consumed, more than a third consumed was beef (35 percent), with poultry taking second with 27 percent, followed by pork and eggs at 12 percent each, fish and seafood at 9 percent, and veal, lamb, assorted meats and other meats constituting the remaining 7 percent.

One concern with the CSFII 1994-96 data is the significant difference in the amount of meat reported consumed by respondents in the CSFII 1994-96 and the amount the USDA reports in it's Food Consumption, Prices, and Expenditure report, often called disappearance data. Beef is underreported by 32 percent, pork by 63 percent, poultry by 47 percent and fish and seafood by 23 percent. This result is not inconsistent with other comparisons between CSFII respondents and national averages, for example the daily average caloric intake for Americans between 1994 and 1996 was 3,800 kCal (Statistical Abstract of the U.S.), but the CSFII respondents only reported a daily average of 2,100 kCal.

Econometric Issues

From the reduced demand equation (8), meat demand is a function of market prices, wages and full income, given household and individual socio-demographic characteristics, individual health related characteristics, an individual's level of health information, her sensitivity to time delay at a specific meal, and whether the meal was prepared at home or away from home.

However, given the data set and nature of the problem, this study will need to address some of the anticipated econometric issues. The first is that nutrient intake is analyzed on a per-meal basis. As such, those individuals who ate more meals will have more observations and estimated error terms will likely be correlated across observations for a given individual. After correcting for serial correlation, we will also need to account for the uneven number of records. Thus, the weights used will be the reciprocal of the numbers of meals (M_i) recorded for that individual ($w_i = \frac{1}{M_i} \cdot SampWgt_i$) where $SampWgt_i$ is the sampling weight from the DHKS survey. These 3-year sampling weights to more accurately reflect the population between 1994 and 1996..

Another issue that can lead to problems with the econometric estimation is that, as is common with cross-sectional data, there is no information on expenditures or prices. However, since the individuals' intake choices were made at a single point in time, it is not unusual to assume there is little variation in prices across households and that these differences can be captured by the geographic location and urbanization of the household (Variyam et al, 1995, 1996).

A third econometric issue is that several of the right hand side variables, namely health information, hunger, and food source, are arguably endogenous. The standard econometric method of correcting problems of endogeneity is to use some type of instrumental variables (IV) estimators. For the IV approach to yield consistent estimates, the instruments used must meet the conditions of exogeneity and relevance. Yet, as summarized by Park and Davis (2001), there are three properties of cross sectional data and nutrient demand analysis that lead to relevancy condition not being satisfied:

(i) While in the short run, the conditional demand for nutrients is a function of prices, full income, time constraints, health information and individual endowments, the long run, or unconditional, demand for nutrients is a function of prices, income, time constraints, and individual endowments;
(ii) Most cross sectional data sets do not have information on market prices, time constraints, and full income;
(iii) The correlation between many variables in cross-sectional data is very low.

Thus condition (i) suggests that theoretically, variables in the unconditional demand equations can provide instruments for the conditional demand equation. Due to property (ii) the only available instruments are the individual's personal and household characteristics. However, there is no theoretical reason for partitioning these characteristics into either the conditional or the unconditional demand equations. Finally, the low correlation among variables means that IV estimators may still be biased and inefficient. Based on these problems and the results of a comparison between OLS and IV estimates using cross-sectional data, Park and Davis concluded that OLS estimates were preferred and suggest employing multiple model estimators and specifications. As such, this study will use WLS estimators for the econometric analysis of meat intake. The meat demand model used for estimation is a linear equation relating meat consumption to household and individual socio-demographic ($\varepsilon 1$) characteristics, individual health related characteristics ($\varepsilon 2$), an individual's level of health information (η), her sensitivity to time delay at a specific meal (Γ_m), and whether the meal was prepared at home or away from home (FS_m):

(10) $$X_{mj} = \beta_o + \beta'_1 \varepsilon_1 + \beta'_2 \varepsilon_2 + \beta'_3 \eta + \beta_4 \Gamma_m + \beta_5 FS_m + \varepsilon^*$$

Where β_0 is an intercept term, β_1 through β_5 are structural coefficients and ε^* is a random error term. A list of independent variables, excluding information, is found in Table 4. The list of variables that will be used to proxy one's level of information is found in Table 5. The proxies for information have been grouped into four general categories: Practices, Awareness, Importance and Perceptions. We feel doing this will illuminate how information is used when making food choices. For example, although one may be fully aware of the links between being overweight and health problems, if she does not think it is important, she will be less likely to act on this information.

Conclusions

The purpose of this paper will be to develop and present a new approach for examining the demand for meat by incorporating many of the advances in behavioral economics. By providing a closer approximation to how consumers actually behave, doing so should improve upon existing models. Incorporating findings from behavioral studies will also provide a richer theoretical basis to correct for the longstanding problem of endogeniety in cross-sectional studies.

The main limitation of this study lies in the availability of surveys that collect all the data of interest. For that reason, we have chosen to apply this model to data on Americans' food choices. However, given that the demand for convenient foods is increasing throughout Europe and the incidence of obesity is also increasing, albeit only in specific regions, results of this study should be useful as the European agri-food system explores ways of becoming more diverse.

Table 1: Percent of meat reported eaten by source and eating occasion

	Food Source					
Eating location	**Grocery store**	**Fast food**	**Other restaurant**	**Cafeteria**	**Other source**	**All sources**
At home	91%	34%	10%	1%	26%	65%
Away from home	9%	66%	90%	99%	74%	35%

Table 2: Percent of various meats reported eaten at home and away from home

	Meat					
Location	**Beef**	**Pork**	**Poultry**	**Fish and Seafood**	**Veal and Lamb**	**Other and Assorted Meats**
At Home	34%	13%	26%	8%	1%	5%
Away from Home	35%	11%	27%	11%	< 1%	6%
All Locations	35%	12%	27%	9%	< 1%	6%

Table 3: Percent of various meats reported eaten at home and away from home

	Meat						
Location	**Beef**	**Pork**	**Poultry**	**Fish and Seafood**	**Veal and Lamb**	**Other and Assorted Meats**	**All Meats**
At Home	64%	69%	64%	59%	71%	61%	65%
Away from Home	36%	31%	36%	41%	29%	39%	35%

Table 4:Independent Variables and Definitions

Category	Variable	Definition
Household Characteristics	Income Program Size Region Urban PctPov	Total household income in $1,000 1 if participate in food assistance program; zero otherwise Number of members in household 1 if Northeast; 2 if Midwest; 3 if South; 4 if West 1 if central city; 2 if suburb; 3 if rural Percentage of the poverty threshold
Socioeconomic and Demographic Characteristics of Main Meal Planner	Age Female College Race Employed	Age of meal-planner in years 1 if meal planner is female; 0 otherwise 1 if attended school beyond 12^{th} grade, 0 otherwise 1 if White, 2 if Black; 3 if Hispanic; 4 if other Number of hours worked in previous week
Health Related Factors of Main Meal Planner	Vegetarian MeatDiet Condition BMI Smoker TV Exercise Water	1 is vegetarian 1 if on special diet 1 if doctor condition Ratio of body weight (kgs) to squared height (meters) 1 if smoker Average hour of t.v. watching per day Average exercise frequency per week Average daily water intake
Sensitivity to time delay	Interval Calories EmpPlan	Time elapsed between meals Percent of total daily calories consumed at previous meal 1 if meal planner is fully employed
Food Source:	Fast Food Slow Food Home	1 if food source came from fast food restaurant 1 if meal came from a sit down restaurant 1 if meal was prepared at home

Table 5: Information Variables

Category	Variable	Definition
Practices	Lowfat	Individual eats lower-fat luncheon meat
	lunmeat	Individual reads labels on lunch meat
	rawmeat	Individual reads labels on raw meat
	switch	Individual switched to fish and poultry
	trim	Individual trims fat off meat
Awareness	Meatdiet	Individual is on a diet that may affect meat intake
	meatknow	Individual's score on questions pertaining to fat content of meat
	weiawar	Individual's awareness of problems from being fat
	choaware	Individual's awareness of problems from consuming too much cholesterol
	fataware	Individual's awareness of problems from consuming too much fat
Importance	Priceimp	Importance of price
	conimp	Importance of convenience
	nutimp	Importance of nutrition in diet
	impfat	Importance of eating foods low in fat
	impchol	Importance of eating foods low in cholesterol
	impsat	Importance of eating foods low in saturated fat
	imweight	Importance of being overweight
Perceptions	percalhi	Diet is reportedly high in calories
	percholhi	Diet is reportedly high in cholesterol
	perfathi	Diet is reportedly high in fat
	persathi	Diet is reportedly high in saturated fat
	weighthi	Individual says she/he is too heavy
	percallo	Diet is reportedly ow in calories
	percholo	Diet is reportedly low in cholesterol
	perfatlo	Diet is reportedly low in fat
	persatlo	Diet is reportedly low in saturated fat
	weightlo	Individual says she/he is too thin

References

Associated Press, (2001) "Government Urges Change as Obesity, Diabetes Rates Climb." *Star Tribune.* October, A15.

Becker, Gary, (1965) "A Theory of the Allocation of Time," *The Economics Journal* (75), September: 493-517.

Food Marketing Institute, (2001a) "Reaching Out to the Whole Health Consumer." in *Prevention Magazine*. Rodale Incorporated.

Food Marketing Institute, (2001b) "What Working Women Want: Based on Trends in the Unitied States: Consumer Attitudes and the Supermarket, 2001."

Frazao, Elizabeth, (1999) "High Costs of Poor Eating Patterns in the United States." in *Americas Eating Habits Changes and Consequences*, ed E. Frazao. Agriculture Information Bulletin Number 750, Economic Research Service, United States Department of Agriculture.

Kennedy, E., S.A. Boman, M. Lino, S.A. Gerrior and P. Basiotis, (1999). "Diet Quality of Americans: Healthy Eating Index", in *Americas Eating Habits Changes and Consequences*, ed E. Frazao. Agriculture Information Bulletin Number 750, Economic Research Service, United States Department of Agriculture.

Lancaster, Kelvin J., (1966) "A New Approach to Consumer Theory." *Journal of Political Economy*.(74): 132-156.

Lin, Biin-Hwan, J. Guthrie, and E Frazao, (1999) "Nutrient Contribution of Food Away From Home" in *Americas Eating Habits Changes and Consequences*, ed E. Frazao. Agriculture Information Bulletin Number 750, Economic Research Service, United States Department of Agriculture.

Lowenstein, George and D. Prelec, (1992) "Anomalies in Intertemporal Choice: Evidence and Interpretation," in *Choice Over Time*, ed George Lowenstein and John Elster. New York: Russell Sage Foundation.

News Service, (2001) "Obesity May Soon Kill More Americans than Cigarettes." *Star Tribune*. http://www3.startribune.com December 14.

Park, J and G.C. Davis, (20001) "The Theory and Econometrics of Health Information in Cross Sectional Nutrient Demand Analysis." *American Journal of Applied Economics.* (83:4) November 2001: 840-851.

Richman, Nessa J., (1999) *The Natural Foods Market: A National Survey of Strategies for Growth.* Policy Studies Report Number 12. The Henry A. Wallace Institute for Alternative Agriculture. Greenbelt, Maryland.

Senauer, Ben, Elaine Asp, and Jean Kinsey, (1991) *Food Trends and the Changing Consumer.*

Eagan Press, Minnesota .

Variyam, J.N., Blaylock, J. and D. Smallwood (1996) “A Probit Latent Variable Model of Nutrition Information and Dietary Fiber Intake. *American Journal of Agricultural Economics.* (78) August, 1996: 628-639.

Variyam, J.N., Blaylock, J. and D. Smallwood (1995) “Modeling Nutrient Intake: The Role of Dietary Information.” Food and Consumer Economics Division, Economic Research Service, U.S. Department of Agriculture. Technical Bulletin No. 1842.