

EMERGING DATA ISSUES IN APPLIED FOOD DEMAND ANALYSIS

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#### **EDITORS' NOTE**

This Tennessee Experiment Station Bulletin is the edited collection of seven papers presented by members of the Changing Patterns of Food Consumption (S216 Regional Committee) at a 1993 Workshop held by the Regional Committee. They focus on a variety of emerging issues associated with data sets used in applied demand analysis. These pertain to topics that are not discussed in the extant literature but are quite germane to the extension of empirical models of food consumption.

**CURRENT ISSUES IN CONSUMPTION DATA:  
FOOD AWAY FROM HOME DATA**

Vicki A. McCracken, David W. Price, and Dorothy Z. Price<sup>1</sup>

Food expenditures by U.S. families and individuals in 1992 were \$503 billion. Over 37 percent of total household food spending went for food away from home (FAFH), up significantly from around 25 percent in the early 1960's. An alternative data series indicates that the share of food expenditure for food away from home rose from 26.6 percent in 1960 to 45.3 percent in 1990. Irrespective of the data series, the importance of the away-from-home food sector is obvious and should not be overlooked in attempts to understand the consumer and the food marketing and distribution system.

Data needs related to food away from home have been of special concern to S-216 for at least the past five years. This area was identified as high priority at the Data Needs Symposium held in 1989 at the annual AAEA meetings in Baton Rouge. Following that meeting, the Economic Statistics committee of AAEA argued that a symposium related to food away from home data be held at the 1992 annual meeting in Baltimore. At that symposium, the consensus was that the problem be taken up by the S-216 committee.

Numerous food-related data series have been designed, developed, and maintained by public and/or private sources. Most of these data series were not developed with the intent of using them in demand analyses (Bobst, Branson, Haidacher, et. al, 1987). This is particularly true for some of the data series that contain detail on food away from home. This paper focuses on data series that are currently available to analyze consumption/demand for food away from home. Specifically, the objectives of this paper are to:

- 1) describe the data that are currently available;
- 2) identify problems/issues with available data;
- 3) identify types of data that are not available that are needed; and
- 4) make specific and realistic recommendations for action.

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### **Description of Available FAFH Data**

Food demand analyses are based on either time-series or cross-section data or a combination of time-series and cross-sectional data (panel data). Time series data are usually of an aggregate nature (e.g., total value for the U.S. or a U.S. subsample) and are collected regularly at various time intervals (e.g., annually, quarterly). Cross-section data typically refer to observations on individual units (e.g., individuals or households) at approximately a single point in time. Pooled time-series/cross-section data usually consist of information about an individual or household, collected at multiple points over time. A true panel follows the same group of individuals over time. Most surveys, however, have a prearranged rotation of the individuals or households in and out of the panel, and hence do not constitute true panels.

Various types of data have been used with varying degrees of success to analyze the demand for FAFH. Traditionally, FAFH demand studies have relied upon data collected by public agencies that were of a cross-sectional nature, although some aggregate studies have used time series data. Recently, researchers have used data collected by a private firm. The following section briefly describes some of the commonly used data sources.

#### **Aggregate Time Series Data**

- U.S. Department of Agriculture/Economic Research Service - There are several aggregate time series data sets compiled by the U. S. Department of Agriculture (USDA) which differ in terms of coverage (i.e., items included), data sources, and methods of collection. It is important that the researcher be aware of these differences in order to appropriately use the information (Manchester, 1990). Three major food expenditure series generated by the USDA are noted below.

1. Total Food Expenditures - This data series includes food purchased (including from food stamps) and food that is donated or home-produced, and sport fish and game. Note that purchased food includes food paid for by families and individuals, food in travel and entertainment paid for by businesses, and food furnished to employees, prisoners, and hospital patients. This data series includes annual data back to 1889.
2. Food Expenditures From Personal Income - By excluding from total food

expenditures the portion of food expenditures not paid for by families and individuals, the series measures expenditures out of personal income. This data series excludes the value of donated food, nonfarm and home-produced food, expense account meals, and meals for patients and inmates; it also excludes food and cash donated to schools and institutions. Personal income includes items which are not paid directly to workers (including fringe benefits such as employer contributions for health insurance) and personal income transfer payments such as food stamps.

3. Food Expenditure From Personal Money Income - As with the previous data series, this excludes the value of donated foods. Personal money income includes only income in money form, excluding fringe benefits and transfer payments.

- U.S. Department of Commerce

Personal Consumption Expenditures (PCE) for Food--This annual data series for the period 1929 to present includes expenditures from personal income for human food, pet food, and animal feed (mostly for personally owned horses). It covers food bought with food stamps and food produced and consumed on the same farm. The data series also includes information on consumer expenditure for all other goods and services, income and savings, and hence is a comprehensive data set.

There are a number of differences between the total food expenditure series compiled by the USDA and the food category of the personal consumption expenditure series compiled by the U.S. Department of Commerce. Hence the calculated percentage of food expenditures for meals and snacks away from home differs significantly depending upon the data series used. Some of the differences result from the inclusion of expenditures for food by businesses and food served in hospitals and institutions in the total expenditure series and the exclusion of these items from the personal consumption expenditure series. In 1989, for example, the share of food expenditures attributable to meals and snacks away from home ranged from 38 to 45 percent for the three USDA data series and was approximately 33 percent for the U.S. Department of Commerce series (Table 1). The appropriate number depends upon the purpose of the research.

#### Other Aggregate Data

- U.S. Department of Commerce's Input-Output Data - The U.S. Department of Commerce, Bureau of the Census conducts economic censuses approximately every five years. These censuses cover retail trade, wholesale trade, service

Table 1. Food-Away-From-Home Share of Total Food Expenditure, 1989

Data Series	Food-Away-From-Home Share
1. U.S. Department of Agriculture/Economic Research Service	
a. Total Expenditure for Food	45%
b. Total Expenditure for Food from Personal Income	38%
c. Total Expenditure for Food from Personal Money Income	38%
2. U.S. Department of Commerce	
a. Personal Consumption Expenditure	33%

industries, construction industries, etc., in the United States and its territories. The data enable researchers to follow the flow of commodities across industries and different levels of the marketing system (i.e., intermediate products, value added, and final demands). Hiemstra and Qu (1992), for example, looked at the intermediate data for five of the 537 available industries which they felt constituted the food service industry (i.e., eating and drinking places, hotels, health services, education, and social institutions). They measured the importance of each major food and kindred product group in terms of direct intermediate inputs into the food service industry.

The Department of Commerce's Input-Output data appear to be useful in measuring the composition of various kinds of foods purchased as inputs in the FAFH industry. The data are historically and internally consistent (at least since 1977) and are consistent across a large number of industries and at different levels of the marketing system, thus permitting a researcher to follow the flow of commodities through the system.

There are definitional problems in using the input-output data for the food service industry. It is necessary to redefine the eating and drinking



place industry in order to conduct a meaningful analysis, but a redefinition causes problems of matching industry groupings with BLS price indices which are needed to deflate data and to match final demands related to food store sales. Other limitations of the input-output data are that they refer to expenditures, not quantities; the data are available at five year intervals only (years ending in 2 and 7); and there is a time lag between the time that the data are collected and when they are available for analysis (e.g., the 1982 data were not available for analysis until 1992).

The input-output data are likely not too useful to a researcher whose goal is to conduct consumer level demand studies, but they do provide valuable information about the food service industry.

#### **Disaggregate Cross Section and Panel Data - Public Agencies**

Information on detailed expenditures, prices, and quantities for FAFH are available only from periodic surveys of households and individuals. The most frequently used surveys in demand analyses are: 1) U.S. Department of Agriculture, Human Nutrition Information Service's (HNIS), Nationwide Food Consumption Surveys (NFCS) and Continuing Surveys of Food Intake by Individuals (CSFII); and 2) U.S. Department of Labor, Bureau of Labor Statistics (BLS), Continuing Consumer Expenditure Survey (CCES).

- NFCS and CSFII<sup>2</sup> - The USDA conducts the NFCS approximately every ten years, with surveys conducted in 1936, 1942, 1948, 1955, 1965/66, 1977/78, and most recently in 1987/88. These surveys are designed to describe food consumption behavior and to assess the nutritional content of the U.S. diet for policy decisions relating to food production and marketing, food assistance, nutrition education, and food safety. However, these surveys are not specifically designed for demand analyses. There have been changes and refinements made in these surveys over the years, including an expansion to collect dietary intakes of individual members from home food supplies

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<sup>2</sup>See the Workshop paper by Hama, "CSFII and HFCS Data: Issues, Problems, and Needs", for more detail.

(starting in 1965) and dietary intakes of individual members from away-from-home sources (starting in 1977/78).

A comparable survey instrument has been used by U.S. Department of Agriculture to collect information on a continuing basis about U.S. diets and diets of population subgroups of concern (e.g., women ages 19 to 50 years and their children). The CSFII data also provide information about food consumption away from home. The following discussion focuses mainly on the NFCS in 1977/78 and 1987/88 (but also pertains to the CSFII), as the interest here is in data for FAFH analyses.

The NFCS sample is intended to be a self-weighting, multistage, stratified area probability sample of the defined population, namely, private households in the 48 conterminous states and individuals in those households. The stratification accounts for geographic location, degree of urbanization, and socio-economic considerations. The sampling unit is the household. The total survey consists of two parts: (1) a household survey, and (2) an individual intake survey. Housing units with nine or more unrelated individuals are not eligible to participate in either part of the survey. For the individual intake survey, all individuals regularly living in the household (excluding roomers, boarders, and employees) are eligible to participate, but household members who are away at school, in military barracks, or in institutions are not included. Interview schedules are set up so as to have representative intake data by day of the week. Due to the difficulty in scheduling interviews on Sunday, this was not achieved in the 1987/88 NFCS.

The household survey is basically a recall of all foods used from home food supplies by the household and guests during the week before the interview. Information collected includes the kinds, quantities, and values of these at-home foods, as well as detailed socio-economic and demographic information about the household. In addition, an aggregate measure is collected for the number of and expenditures on meals consumed away from home during the survey week by the entire household. The individual intake survey,

however, contains detailed descriptions of all foods and beverages consumed at home and away from home; the quantities eaten; the time each eating occasion began; the name the household member gave to each eating occasion; with whom the food was eaten; the source of the food (from home food supplies or obtained and eaten away from home); the place from which food was obtained; and whether fat and salt was used in food preparation. Note that all of this detail is reported for each food item at each eating occasion for each individual household member over a three-day period.

In order to evaluate the usefulness of this data, it is necessary to examine some definitions and more detailed descriptions of the data. The source of each food item is determined through a series of questions posed by the interviewer. Sources of food include

- 1) food that was eaten at home,
- 2) food that was brought into the home but later eaten away from home, and
- 3) food that was never brought into the home.

Home food supplies include foods from the first two sources, and away from home food includes foods from the third source.

For items from home food supplies, the interviewer questions whether the items were brought into the home from a fast-food/carry-out place, from Meals on Wheels, or from some other place. For items not from home food supplies, the respondent is asked about the place where the item was obtained. These away-from-home sources include,

- 1) restaurant with waiter/waitress service,
- 2) cafeteria or self-serve restaurant,
- 3) restaurant where food was ordered and picked up at counter or window,
- 4) school,
- 5) day-care center or summer day camp,
- 6) community feeding program,
- 7) vending machine,
- 8) store, and
- 9) someone else's home.

For items purchased from vending machines, the respondent is further questioned about the location of the vending machine.

Some strengths and weaknesses of the NFCS data for use in FAFH analyses are identified in the following discussion. Neither the order nor the depth

of presentation of these issues reflect their importance, and these issues are not mutually exclusive.

- Length of Survey Period - Aside from the aggregate household measure of FAFH consumption in the seven day household survey, the FAFH data pertain to a three-day time period. While many households eat out once or more over a longer period, it is not surprising that a sizeable number of household food intake reports do not include food items from away-from-home sources. Zero consumption can arise from one of three broad sources (Pudney, 1980):

- 1) infrequent purchasing,
- 2) misreporting, and
- 3) variation in preferences (and/or prices) across the sample.

Variation in preferences is likely a problem when dealing with relatively specific commodity classifications. Infrequent purchasing (combined with a short survey period) is often a problem, even when dealing with broad commodity groups. The reason for reported nonconsumption of FAFH in the NFCS is not clear, but it is an important issue.

- Level of Analysis - One strength of the NFCS intake data is that it is reported at the individual household member level. Certain analyses, particularly those focusing on nutrition questions relating to consumption of foods from away from home sources, can benefit from this detailed individual data. Other analyses focus on household decision making and behavior, and hence, researchers aggregate the data to the household level. For these researchers, having the data available at the individual level only complicates data handling.

Another strength of the NFCS data is that it is reported at the specific item level (for each individual food item and) eating occasion. Any researcher who has used this data recognizes the complexities of handling such a large data series, but such detail provides the researcher with the flexibility of aggregating the data to fit his/her needs.

- Data Accuracy - Data accuracy pertains to the completeness of the information. There are two separate issues. First, is the sample representative? And second, how accurate are the values that are collected?

With respect to the first issue, there has been considerable discussion concerning nonresponse in the 1987/88 NFCS. The reported response rates are 38 percent for the household component and 31 percent for the individual intake component. It is not surprising that the response rate is considerably lower for the individual intake component. Once the household interview is completed, information still needs to be recalled by (or for) all individuals in the household (some of whom are not home at the time of the interview) and then forms need to be completed by all members for two additional days. There is ample opportunity for individuals and/or households to decide not to respond or continue with the process. Note that while these response rates sound low, they are likely no worse than response rates to surveys conducted by the private sector.

The main problem with low response rates is that the survey results will be biased if there are systematic differences between the respondents and nonrespondents in the behavior being modelled. An expert panel has concluded that it is not possible to ascertain whether there is a response bias problem in the 1987/88 NFCS (GAO, 1991).

Related to the issue of how accurate are the values, one can question the accuracy of data recalled over a seven-day period to obtain the aggregate FAFH quantity and expenditure information, and over a one-day period for the first day of the intake information. Also, one can question the accuracy of data recalled by the meal planner (particularly for foods consumed away from home) for individuals absent at the time of the interview.

- Missing Data - Aside from survey nonresponse, there are typically problems with item (or question) nonresponse in surveys, resulting in missing data problems. One major problem in the NFCS (and other similar surveys) is that a significant portion of the sample (over 20 percent in the NFCS) fails to report household income. And income is typically a key variable in FAFH analyses. One could simply eliminate households or individuals that do not report income, reducing the efficiency and potentially biasing the results. Alternatively, one could use the imputed income values that have been provided

on the data tapes by researchers at USDA/HNIS, and hence use the full data set in their analyses. There are missing values for a number of other socio-economic and demographic variables, but only for a small number of observations.

Another data problem in the NFCS individual intake is that information is not available for one or more days for some household members. Researchers need to be aware of the problem and exercise care when aggregating the data to obtain a workable data file.

- Absence of Price Information - In the individual intake component of the 1987/88 NFCS, information is collected on the quantities of each food eaten but not on the expenditure on these foods. Researchers, consequently, cannot calculate unit values and use these as proxies for prices. Experience with the 1977/78 NFCS (in which value data were attempted to be collected) suggests that consumers were not able to provide a value for each item that they consumed away-from-home. Oftentimes, they do not even purchase the individual components of the meal separately but pay a fixed amount for the entire meal. Even if they do purchase the items separately, they may not be able to recall these individual prices accurately. On the other hand, prices are important variables in demand models. Researchers often assume that prices are constant in cross-section data or that other variables in the model systematically account for price variation and rationalize omitting prices from their models. They usually include the appropriate socio-economic and/or demographic variables in their models to control for the heterogeneity of the quality of foods in the away-from-home sector. This approach is open to question because of the often weak relationship between prices and the socio-economic variables.

- Definition of Food Away From Home - The USDA defines FAFH to include only those foods actually obtained and consumed away from home. That is, foods that are purchased (prepared) away from home but carried home and consumed are classified as at-home foods. Conversely, foods consumed while a guest at someone else's home are considered away-from-home foods. If a

researcher desires to include carry-out foods and exclude meals as a guest from the definition FAFH, this can be easily accomplished with minor programming. Sources of FAFH can be further combined by a researcher, if there is special interest in other classifications of sources (such as commercial versus noncommercial sources). There are limitations, however, to the FAFH source codes used by U.S. Department of Agriculture as they are not mutually exclusive.

- Other - Institutional feeding constitutes a significant component of the away-from-home food market. The NFCS data, however, do not include complete information about this important market segment. Collecting information on foods consumed by individuals living away at school, in institutions, and in organized living units would admittedly be difficult.

- Continuing Consumer Expenditure Survey (CCES) - The U.S. Department of Labor, Bureau of Labor Statistics' Consumer Expenditure Surveys (CES) are another group of household surveys with national coverage frequently used in food demand analyses.<sup>3</sup> These surveys have been conducted at approximate ten-year intervals, between 1888 and 1979. The major objective of the first of these surveys was to collect information necessary to construct the old Cost of Living Index and the current Consumer Price Index (CPI). In 1979, the Continuous Consumer Expenditure Surveys (CCES) were initiated with a smaller group of households (with a prearranged rotation of households in and out of the panel) for use in revising the CPI but also for use in research.

There are two components of the CCES, each with its own questionnaire and sample. The first is an interview panel survey in which approximately 5,000 households are surveyed every three months over a one-year period. This survey collects data on large and infrequent expenditures such as real estate property, automobiles, and major appliances and expenditures that occur on a fairly regular basis such as rents, utility payments, and insurance premiums. Also included in this survey are personal expenditures, including personal

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<sup>3</sup>See the Workshop paper by Chern and Senauer, "Pooled Time-Series and Cross-Section Data from the Consumer Expenditure Survey", for more details.

expenditures for food while the household is away on trips. This survey, in general, attempts to collect expenditure information that is easy to recall over a three-month period.

The second (separate) component of the CCES is the diary survey in which approximately 5,000 households are surveyed to obtain information on small, frequently purchased items such as food and beverages, tobacco, and housekeeping supplies that are typically difficult to recall. This information is collected via an expenditure diary that is kept by the household for two consecutive one-week periods. The diary excludes expenditures incurred by the household while away from home for one night or longer.

The CCES is intended to be a nationwide probability sample of households representing the total U.S. civilian noninstitutionalized population. The rural component of the population was dropped in 1981 due to budget limitations, but was added back in 1984. Many researchers, however, include only the urban portion of the survey in their analyses in order to maintain a comparable sample over the entire time period.

The sampling unit in the CCES is the consumer unit (as opposed to the household in the NFCS). A consumer unit consists of: (1) all members of a household related by blood, marriage, adoption, or other legal arrangements; (2) a financially independent person living alone or sharing a household with others, living as a roomer in a private home or lodging house, or living in permanent quarters in a hotel or motel; or (3) two or more persons living together who pool income to make joint expenditure decisions. Note that the CCES includes individuals in group dwellings such as college students living in dormitories.

The diary component of the CCES typically provides the data used in food demand analyses, and hence will be the focus in the following discussion. The diary provides a record of all expenses incurred by the consumer unit during the survey period. The expenses are recorded by day of purchase and for broad categories of goods and services. These categories are fairly detailed for



food items purchased for consumption at home (e.g., information is available at the level of white bread, ground beef, and frankfurters). The detail on FAFH expenditures, however, is quite limited. Information is available for total expenditures for FAFH, and away-from-home expenditures disaggregated by type of meal (i.e., breakfast and brunch, lunch, dinner) and snacks and other. Away-from-home food spending in the CCES includes foods purchased and consumed at restaurants, carryouts, and other establishments, and foods purchased at these facilities and carried home for consumption. The CCES diary does exclude expenditures incurred while the consumer unit is away from home overnight or longer. Some strengths and weaknesses of using the CCES data in away-from-home food analyses are identified in the following discussion.

- Length of Survey Period - The expenditure data in the diary component of the CCES are collected over two consecutive one-week periods. This length of period is better than the three-day period in the NFCS, but two weeks may still not be a sufficient length of time for consumer units to exhibit their typical away-from-home purchasing behavior (particularly for specific commodities). In recent CCES's, approximately 75 percent of all consumer units purchased some FAFH during the survey period.

- Level of Analysis - The CCES measures purchases for the entire consumer unit and not for individual consumer unit members. The individual intake component of the NFCS, in contrast, measures consumption by the individual household members. The nonavailability of the CCES data at the individual level may be a weakness, depending upon the purpose of the analysis.

Another potential weakness of the CCES data is that information is reported at the aggregate level of expenditures on FAFH, total and by meal, but not for expenditures on specific items or even food groups. Without quantity data, this severely limits the usefulness of the CCES data in away-from-home food demand analyses.

- Data Accuracy - The response rate typically cited for the recent CCES's has been around 85 percent. This number suggests that the CCES is

likely to be more representative of the underlying population than is the 1987/88 NFCS. The response rates should not be compared between the two surveys, however, as they are calculated in very different ways. The CCES response rate is based on the eligible sample, excluding selected consumer units that were vacant, nonexistent, or ineligible for the period. The NFCS response rate is based on housing units that were not vacant, including selected housing units that were not contacted and those contacted that were screened out/ineligible (GAO, 1991).

The second issue of data accuracy concerns how good the values are that are collected. The diary questionnaire in the CCES is a self-reporting, product-oriented diary filled out by the respondent for all expenses incurred by the consumer unit during the survey period. One can question the accuracy of expenditure data recorded by the respondent for the entire unit, particularly for expenditures incurred for foods consumed (and other items utilized) away from the home. On the positive side, the accuracy of the CCES data is likely improved as a result of the procedure used where the BLS interviewer picks up the diary after the first week, reviews the entries, and clarifies questions prior to leaving the diary for the second week.

- Missing Data - The Bureau of Census collects and performs preliminary processing and editing of the CCES for BLS. Among other things, the Bureau of Census imputes demographic characteristics for missing or inconsistent demographic data and imputes values for weeks worked when a nonresponse is encountered. BLS subjects portions of the diary data to automated imputation and allocation routines for cases where there is insufficient detail (to meet publication requirements). For example, if only expenditure on meat is reported, this expenditure is allocated between beef and pork using proportions derived from other completed surveys. These imputation/allocation procedures enable BLS to release a complete data set and does not cause biases provided that the missing/incomplete data are completely random. Concerning the processing of income data, BLS identifies consumer units as having complete or incomplete income information but currently does not impute

income.

- Absence of Price and Quantity Information - In the CCES data, neither price nor quantity information is separately available. Given the level of aggregation of the data (total expenditure), this alone is probably not a limitation as the total quantity of food consumed away from home is not a useful concept.

- Definition of Food Away From Home - In the CCES data, foods purchased at restaurants, carryouts, and other commercial facilities and carried home for consumption are assumed to be FAFH. This can be regarded as either a strength or weakness of the CCES data depending upon the specific research objective, because there is no flexibility in changing this definition to meet the needs of the researcher. A potentially greater weakness in the CCES is the exclusion from FAFH expenditures of items purchased while the consumer unit is away from home overnight or longer.

- Other - In terms of population coverage, a strength of the CCES relative to the NFCS is its inclusion of individuals living in group dwellings such as college dormitories. Another strength of the CCFS is that it provides a continuous picture of expenditures on FAFH rather than a snapshot over a short time interval as in the NFCS.

#### **Disaggregate Panel Data - Private Agencies**

Consumer panel data containing information relevant to FAFH demand analyses are collected by private groups. National Purchase Diary (NPD) Group, Inc. is a private market research firm that maintains household panels and supplies data (on a fee basis) to individual firms desiring information on specific product markets. The following discussion focuses on one panel that provides data potentially useful in away-from-home food demand studies.

- Consumer Reports on Eating Share Trends (CREST) Survey - One specialized panel of the NPD Group, Inc. funded by the food service industry is known as CREST. This survey is designed to track expenditures in the commercial segment of the food service industry. The data are available on a quarterly basis back to 1976. These data are fairly expensive for individual

researchers to purchase. The Commodity Economics Division/Economic Research Service/U.S. Department of Agriculture (CED/ERS/USDA) has purchased the data back to 1982, and several researchers are currently using it in their analyses.

The CREST panel is intended to be representative of households in the 48 conterminous states, as indicated by the reported geographic and demographic distribution of the Census Bureau. A stratified random quota sampling system is used to select and maintain the sample (i.e., to maintain the sample size and the appropriate geographic and demographic balance). Approximately 9,400 families and 3,400 nonfamily households are selected to participate in the CREST survey. In particular, 985 households receive a diary each Monday throughout a thirteen week period, generating a full sample of 12,800 households each quarter. Each household maintains a diary over a two-week period.

The CREST data base is both dynamic and longitudinal in nature. This procedure generates approximately 50,000 transactions of restaurant behavior each quarter (Capps, 1992). There are special attempts to ensure representativeness of the panel. As an incentive to participate, panelists are given a gift valued at 25 to 35 dollars, after one year of participation and annually thereafter. Despite these incentives, there are lower response rates and higher attrition rates from black households, single member households, and households at extreme income levels.

In the CREST diary, the household respondent records every meal and snack experienced by household members during the specified two-week period (for each quarter of the year). The meals are classified as breakfast, lunch, or dinner and the snacks are classified as morning snacks, afternoon snacks, or evening snacks. Detailed diary entries are required only for meals and snacks eaten or purchased away from home from commercial establishments. Detailed entries are not provided for other eating situations.

The detailed entries identify the type of food/beverage purchased, type of food service establishment where the food was ordered and where the food

was eaten, cost of the meal, amount of the tip, means of payment (cash, check, or credit card), type of coupon used if any, size of the party and composition, etc.

In terms of the description of the food/beverage, 151 different food items are tracked. These individual items are classified into 22 groups. The major foods that are identified are shown below.

- |                               |                          |
|-------------------------------|--------------------------|
| (1) sandwich items            | (9) salads               |
| (2) meats                     | (10) potatoes            |
| (3) poultry (chicken, turkey) | (11) baked goods         |
| (4) fish/shellfish            | (12) sweets, snack foods |
| (5) breakfast dishes          | (13) ice cream/yogurt    |
| (6) pizza                     | (14) hot drinks          |
| (7) pasta dishes              | (15) soft drinks         |
| (8) mexican dishes            | (16) alcohol beverages   |

The types of food service establishments identified in the CREST data include:

- (1) fast-food/drive-in
- (2) family restaurant
- (3) atmosphere/specialty
- (4) cafeteria
- (5) coffee shop
- (6) take out

Socio-economic and demographic information on the household is also collected in the CREST survey. Specific information includes size and composition, life-cycle category, race, education, occupation, hours worked outside the home by both the husband and the wife, location of residence, and home ownership/rental status. The income category of the household is also recorded.

Some strengths and weaknesses of using the CREST data in FAFH analyses are noted below.

- Length of Survey Period - The expenditure data in the CREST survey are collected over a two-week period each quarter of the year for the selected households. Two weeks may not be a sufficient length of time for households to exhibit their typical away-from-home purchasing behavior for specific food commodities. The CREST data, however, have the advantage that the same households are observed in four consecutive quarters, resulting in eight weeks of observations for the households (provided they do not drop out of the

panel).

- Level of Analysis - The CREST survey measures expenditures away from home for the total eating party and by individual item (151 different items are tracked) for each party member, thus allowing researchers to do some disaggregate demand analysis. Not all commodity groups are represented in detail, prohibiting a complete demand analysis and making it impossible to trace some foods back through the food system. The CREST data do identify the type of establishment from which the food was purchased.

- Data Accuracy - In terms of the representativeness of the sample, the total response rate to the survey is typically not a quoted figure. The attrition rate is generally quoted to be approximately 20 percent per year for the total population. For population subgroups of interest, however, there are lower response and higher attrition rates. In particular black headed households, single member households, and income extreme households are less likely to join the CREST panel and more likely to leave the panel prematurely.

In terms of the accuracy of the values collected, the accuracy of a diary being kept by the respondent for the entire household for all eating occasions can be questioned. It is particularly questionable whether the respondent can recall all individual items consumed by household members away from home.

- Missing Data - In the CREST survey, detailed information is collected only for meals and snacks eaten or purchased away from home. The data do not permit researchers to analyze jointly household at-home and away-from-home food decisions. In addition, the household income information in the CREST survey identifies only the income category in which the household income falls, and does not provide a continuous measure of income.

- Absence of Price and Quantity Information - As with the CCES data, neither price nor quantity information is separately available. Given the disaggregate level of information for some items tracked in the CREST survey, price and quantity information would be very useful in empirical analyses.

- Definition of Food Away from Home - Detailed information is collected

on items purchased away from home and eaten away from home or simply purchased away from home, and the type of establishment purchased is identified.

Researchers can, for example, decide whether or not to include carry-out items in their analyses.

- Other - While the CREST survey tracks 151 individual items consumed away from home in detail, not all items consumed are represented (at the detailed level). Hence, it is difficult to trace some food items or food groups back through the food system. The CREST survey currently provides the most comprehensive, timely data for a national sample of household purchase patterns away from home.

#### **Problems and Recommendations**

The data needed for analyses of FAFH depends on the purpose of the study. If the purpose of the study is an overall nutrient valuation of the diet, the NFCS individual intake data may be sufficient. If the purpose is to analyze selected economic aspects of the FAFH market, the CREST data may be adequate. However, other aspects of the FAFH market are believed to be important. Many economists are concerned with the total demand for a specific product such as apples or beef. A single data set which includes retail level prices, income, relevant socio-demographic variables and quantities for both the at-home and away- from-home food markets would be ideal. The use of different data sets for the two markets leads to problems because of data and definitional incomparability.

Other analyses which have been important in recent years include the relationship between economic variables and nutrition in the away-from-home market. For these analyses, prices, income, relevant socio-economic variables, and quantities of specific food items defined in sufficient detail to measure the nutrient content are needed. Similar data sets are needed for some food safety analyses.

Before going into specific recommendations with respect to data sets, some issues encountered in empirical analyses will be addressed. The first is the issue of prices and quantities for specific products. In the away-from-

home market and increasingly in the at-home market, specific products such as beef and potatoes are combined and sold as combinations. In the away-from-home market, prices are frequently available for only complete meals. Price data do not exist for the value of the specific products. Respondents to surveys, hence, can not be expected to provide such price data. Economists must develop procedures to impute prices of specific products from the prices of mixtures or complete meals. In order to do so, the quantities of the specific items in the mixtures for complete meals must be available. In some situations these can be obtained from the survey interviews. In other situations, recipes must be obtained from restaurants or food manufactures. Another issue is the comparability between time series, cross section, and panel data. Economists must develop methods which allow comparisons between such data sets. At this time no data set exists which meets the needs of the above studies. One of the purposes of this paper is to make recommendations for modifications to existing data sets so that they more closely meet these needs.

The following recommendations are made with the basic premise that new funding will not be available to initiate a survey which would satisfy the data needs of consumption economists. The recommendations focus on attempts to improve existing data sets. Recommendations will be specific to each data set.

#### NFCS and CSFII of Food Intake by Individuals

Data on quantities are sufficient for economic analyses. However, no price data are obtained. It is recommended that price data be obtained for both food away from home and at home. Consideration should be given to obtaining such data from grocery stores and away-from-home eating establishments and not directly from the consumer. It is also recommended that three day recalls be extended to cover a longer time period to provide better estimates of products and meals away from home that are consumed infrequently.

#### NFCS Household Survey



The household surveys have provided excellent data sets for at-home food consumption analyses. Food quantity and expenditure data have been recorded for a seven-day period. The quantity data are of sufficient detail for consumption analyses. However, they have not included detail on food which was purchased and eaten away from home. Given the increasing importance of the away-from-home food market, failure to measure adequately this market decreases the relevance of this data set. It is recommended that these household surveys be expanded to include food purchased and eaten away from home, keeping the same detail on quantities of specific products as in the past surveys. Prices could be provided for complete meals and mixtures. Economists must then develop methods to impute prices to specific commodities.

#### CCES

This survey does not include quantities or prices of food products, and hence a major change would be required to obtain this information. Such a change is unlikely. Since this survey does provide useful expenditure data, two minor changes are recommended which would increase the usefulness of this data set for FAFH analyses. It is recommended that the diary portion include food expenditures for the household while away from home one night or longer. It is also recommended that the away-from-home food expenditures be linked to types of eating establishments.

#### CREST Survey

The purpose of this survey is to provide data specifically on away-from-home food consumption. One cannot expect it to provide a complete picture of total food consumption. It is however, recommended that the quantity of specific food items consumed be added to the survey. This is a major addition to the survey, but it is likely to be useful for many purposes. In addition, it is recommended that the number of specific food items covered be expanded.

#### Department of Commerce Input-Output Data

This is a special data set, and is not useful for food demand analyses. However, it is useful in analyzing other aspects of the food industry. There are two problems with this data set for which actions are recommended. The

first is the time lag in the availability of the data. Currently, there is a ten-year lag between the period to which the data refer and the time when the data are available for analysis. It is recommended that this be shortened to two to three years. The second problem is the lack of comparability of the input-output data useful in analyzing the food service industry with the available BLS price indices. It is recommended that definitions be modified so as to make the two data sets comparable.

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