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## **Who Eats What, When, and From Where?**

**Andrea Carlson, Jean Kinsey, Carmel Nadav**

Department of Applied Economics  
University of Minnesota  
carl0582@tc.umn.edu  
jkinsey@dept.agecon.umn.edu  
cnadav@dept.agecon.edu

612-625-7019 Phone  
612-625-2729 FAX

Andrea Carlson is a Ph.D. candidate and research assistant in the Department of Applied Economics, University of Minnesota. Jean Kinsey is a Professor and Director of The Retail Food Industry Center. Carmel Nadav is visiting Professor. The work was sponsored by The Retail Food Industry Center, University of Minnesota, 317 Classroom Office Building, 1994 Buford Ave., St. Paul, Minnesota, 55108-6040, USA. The Retail Food Industry Center is an Alfred P. Sloan Foundation Industry Study Center.

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### **Abstract**

The popular impression that over half of our food does not come from a retail food (grocery) store is based on food expenditure data and is misleading. This research set out to learn where people obtain the food they report eating and to determine whether there are significant differences between people who buy most of their food from retail food stores and those who do not. Research on food consumption often focuses on household expenditures at retail food stores and various types of restaurants, but tracking the volume of various types of foods purchased from various retail places is not well established.

The Continuing Survey of Food Intake of Individuals survey for 1994 showed that 72 percent of the volume of food consumed was from retail food stores. Age had the largest impact on where people shopped, and when and how many meals they ate. Income and household composition had relatively little impact.

Cluster analysis grouped consumers based on where they obtained their food. The largest cluster, nearly half of the individuals, were labeled the Home Cookers. They obtained 93 percent of their food from stores and account for 59 percent of food sold from retail food stores. The High Service cluster is only 10 percent of the sample, but they consumed 50 percent of the food sold in restaurants and only 6 percent of food sold by grocers.

Looking at the diets of people in the various clusters reveal that those in the Fast Food clusters ate less fat than the average of the sample while High Service (restaurant) users ate more fat. Home Cookers ate less than the average amount of meat, eggs, and vegetables.

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# Who Eats What, When, and From Where?

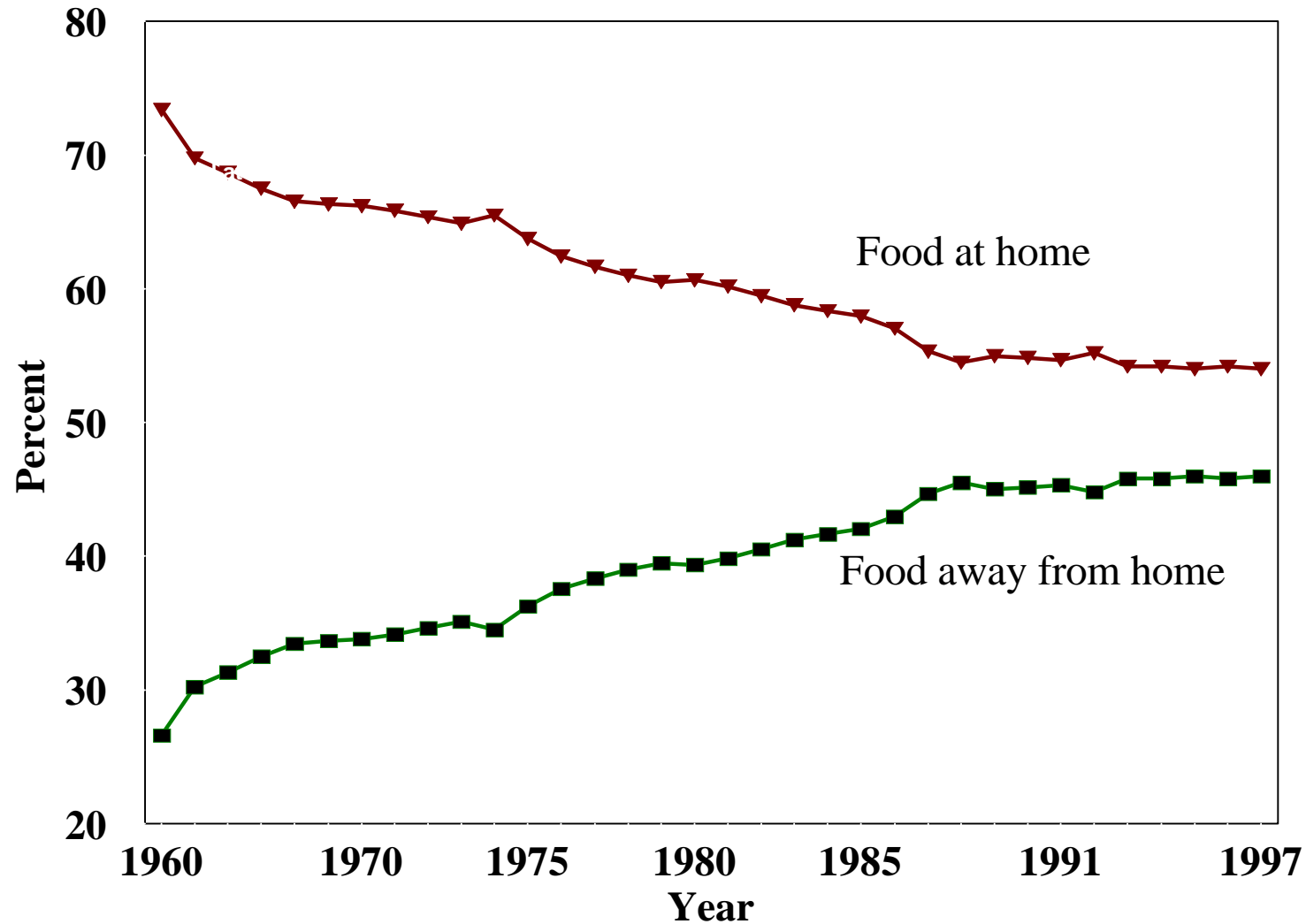
## Introduction

As Americans spend a smaller percent of their income on food, they spend a larger percent of their food dollar on food service and convenience. These two facts dominate the economics of food consumption in the United States. First, since 1960 the percent of personal disposable income spent on food fell from 25 percent to 11 percent. Second, the percent of the food dollar captured by the food service and restaurant sector since 1960 grew from around 26 percent to 46 percent (Putnam and Allshouse, 1996, p. 139 ). Figure 1 shows this growth leveling off, but the rate of growth in sales at commercial food service establishments averaged 4.4 percent in the last three years while sales in grocery stores increased only 3.5 percent in current dollars. Identical store sales declined in real terms in four of five years between 1993 and 1997 (FMI, 1998). Many industry analysts predict that all future increases in food spending will go to food service or take-out food vendors (Bishop, 1997). More ready-to-eat food is being offered by grocery stores as consumers display a preference to eat at home without having to cook at home. Between 1990 and 1997, supermarket food service sales tripled to over \$14 billion (Swientek, 1997; Food Institute Report, 1997). There is an increased demand for take-out food from all sources. In 1998 take-out food sales reached \$85 billion or 12 percent of food sales (Wax, 1998). Fast food restaurants have 41 percent of this market in terms of dollar sales, and retail food stores have only 6 percent (Mills, 1998).

Figure 1 uses the traditional definitions of food at home and food away-from-home. That is, food at home is food purchased in a grocery store or other off-premise outlet, while

# Percent of Food Expenditure

Home & Away, USA, 1960-1997



**Figure 1:** Americans spend noticeably less on food from stores (labeled food at home) now than they did in decades past. However, since 1990 the decrease in expenditures on food from stores has leveled off.

food away-from-home is food purchased in a food service establishment of any type. Now about half of the food purchased in food service establishments is taken out, and much of it is eaten at home (Bishop, 1997; Larson, 1998).

Almost all the percentages that refer to food at home and food away-from-home are based on food expenditures or sales. They have been regularly (and mistakenly) interpreted as the *amount of food* consumers eat at home or away from home. This study analyzes the quantity of food, measured in grams and calories that is obtained from various retail sources to see how closely it corresponds with expenditures in various retail food establishments. It uses dietary recall data, where individuals list the quantities of all foods they ate over two, non-consecutive 24 hour periods, where they ate the food, and where they obtained the food.

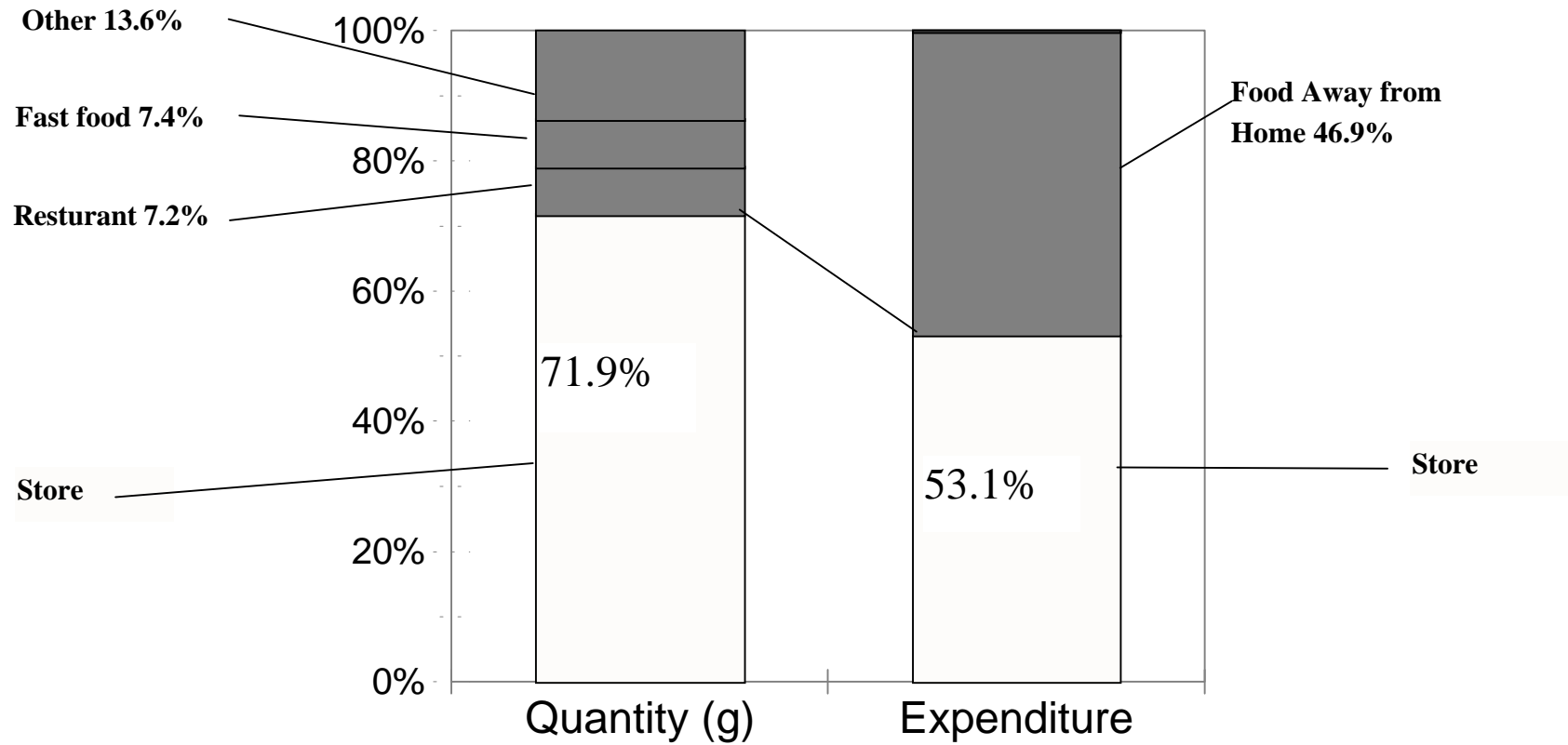
When measured by grams (or by number of calories), 72 percent of food actually eaten comes from retail food stores. This food is purchased with only 53 percent of all food expenditures. Another 14 percent of the quantity of food purchased is split evenly between fast food/pizza establishments, and other restaurants. The remaining 14 percent is split between cafeterias, gifts, vending machines, coffee or food on a common tray in an office, bars and taverns, home gardens or hunting and fishing, and public programs (USDA, 1994) (Figure 2).

All members of the food industry compete both for a share of consumers' budgets, and a share of their diets. A complete understanding of shopping and eating patterns involves knowing where consumers purchase, prepare, and eat their food. All persons involved with the food trade, including food vendors at each link of the food chain, food demand and marketing analysts, and public policy makers concerned with either food programs for the poor or food safety for all, will be better informed by an understanding of consumers' food shopping and eating behaviors.



# Source of Food

## by weight and expenditure



**Figure 2** There are at least two ways to examine food consumption. The bar on the right (expenditure) shows the traditional way of measuring food consumption – in dollars. However, if measured by calories or grams of food consumed, the picture is quite different. The bar on the left (quantity) represents what people actually eat – or “the share of stomach.” When measured in grams, 71.9% of food people eat comes from stores.

## **Data and Methodology**

This study used data from the Continuing Survey of Food Intake of Individuals (CSFII) 1994 (USDA, 1994). These data are collected annually, analyzed and made available for public use by the Human Nutrition Information Service, United States Department of Agriculture (USDA).<sup>1</sup> They are the only publicly available data that reveal the full range of foods individuals actually eat, when and where they eat it, and where they obtain it. Therefore, these data provide a better picture of overall food consumption behavior than data collected at the market level where sales are the unit of measure. Unfortunately, the data set does not include food prices or expenditure information, so economic analysis is limited to income effects.

This study began by sorting the food consumed by 5,589 individuals in 2,540 households in the United States according to where the food was obtained (store<sup>2</sup>, restaurant, pizza and fast food restaurant, other people, bars and taverns, school and non-school cafeterias, common coffee pot or food tray in an office, public program<sup>3</sup>, and food which is home grown or caught by the consumer or someone the consumer knows). Each individual reported food intake for two non-consecutive days, with a total of over 150,000 observations on individual food items. In addition to demographic and purchase location information, the data include information on where food

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<sup>1</sup> These data are available from the U.S. Department of Commerce, Technology Administration, National Technical Information Service, 5285 Port Royal Road, Springfield, VA, 22161 (703-487-4650) <http://www.ntis.gov>

<sup>2</sup> Store includes the following establishments: supermarket, grocery store, warehouse, convenience store, drug store, gas station, bakery, deli, seafood shop, ethnic food store, health food store, commissary, produce stand, and farmer's market.

<sup>3</sup> Public programs include: child or adult care centers, day care center in a private home, soup kitchen, shelter, food pantry, Meals on Wheels, and other community food programs.

was eaten (at home or not at home), and whether the food was ever at home. The response rate is 80 percent for the first day, and 76 percent for the second day. The overall mean household income for this sample of households is \$40,439, and the average household size is 3.0 persons. Table 1 shows the mean income and household size by region and other demographic information for the sample and data from the U.S. Census Bureau. Average annual household income is \$2,693 lower for the sample than the U.S. Census Bureau's estimation of \$43,133 in 1994. However, the CSFII reports incomes over \$100,000 as \$100,000, which is below the mean of the highest income quintile in the Census data. This truncated data results in lowering the average figures; the actual average income of the sample households is likely closer to the national average than it appears. This study used three income categories based on how the household income compares to the national poverty line: zero to 130 percent, 130 - 300 percent, and over 300 percent, henceforth referred to as lower, middle and upper income. Since the poverty line is based on the number of persons in a household, the percent of the poverty line gives a better measure of the family's ability to purchase food than income does. For example, even though there are economies of scale in food purchases, a single person household could afford to spend more on food per person than a household of six with the same annual income. The single person household is likely to purchase more meals away from home than the family of six. If this study used income alone, it would be impossible to distinguish between these two types of households.

The mean household size is somewhat larger in the sample. One explanation is that in larger households it is easier to find someone at home who will agree to participate in the survey. The percent of individuals living in one and two person households is nearly the same in the sample and the 1990 Census, but the sample has more persons in three person's households than

there are in the Census. Nearly 34 percent of all survey participants live in central cities, 42 percent in non-central cities, and the remainder in rural areas. Other summary statistics for the CSFII and the Census are shown in Table 1.

The study also employed the Diet and Health Knowledge Survey (DHKS) to discover correlation between diet and attitudes toward food and health. The DHKS measures individuals' nutrition knowledge and their attitudes on their own diet, health, and food safety and quality. The survey selected one person from each of the CSFII households to participate in the DHKS. There are 1,879 participants in this survey.

## **Full Sample Analysis and Non-Parametric Tests**

The first set of questions addressed by this study dealt with the retail sources of food and which types of people were most likely to shop or eat at various stores and restaurants, their demographic characteristics, and general attitudes about price, quality, and health. Since most of the data are categorical (for example: sources of food, race, occupation, and income category), there are several non-parametric tests which answer the question: "Does the distribution of a variable in a subgroup differ from the distribution in the rest of population?" For example, does the distribution of the source of food for young adults differ from the distribution for the rest of the population? This study uses three non-parametric tests: the chi-squared, the Kolmogorov-Smirnov test, and Kruskal-Wallis which Siegel (1956) describes in detail.

Both tests measure differences in the distribution of the variable. For example, Figure 3 shows the distribution of the number of breakfasts eaten in two days for two different age groups (children age 1-12, and teens age 13-18). Note that on average, 89 percent of children ate

breakfast on both days, while only 59 percent of teenagers did so. The statistical tests measure how significant these differences in the distribution of breakfast habits are. That is, how likely it is that the two sample groups are actually drawn from two population groups with the same distribution of breakfast habits. The Kruskal-Wallis test is used for variables which can be ranked, such as age. The observations are ranked, and the ranks used to calculate a score, which is compared to a chi-squared table. The Kolmogorov-Smirnov test measures the maximum distance in the cumulative distributions between two groups. Figure 4 shows the cumulative distributions for the breakfast habits of the two groups whose distributions are shown in Figure 3. The maximum vertical difference between the two distributions is found at two breakfasts and is equal to 0.3. This number is compared to a Kolmogorov-Smirnov statistical table to find out the probability that these distributions are in fact similar. If the breakfast habits of these two population groups are the same, the cumulative distributions of the two sample groups would be close. That is, the two lines in Figure 4 would be very close together. The Kolmogorov-Smirnov test finds that the distributions for these two groups are significantly different.

**Table 1: Summary Statistics of Data Set (Averages)**

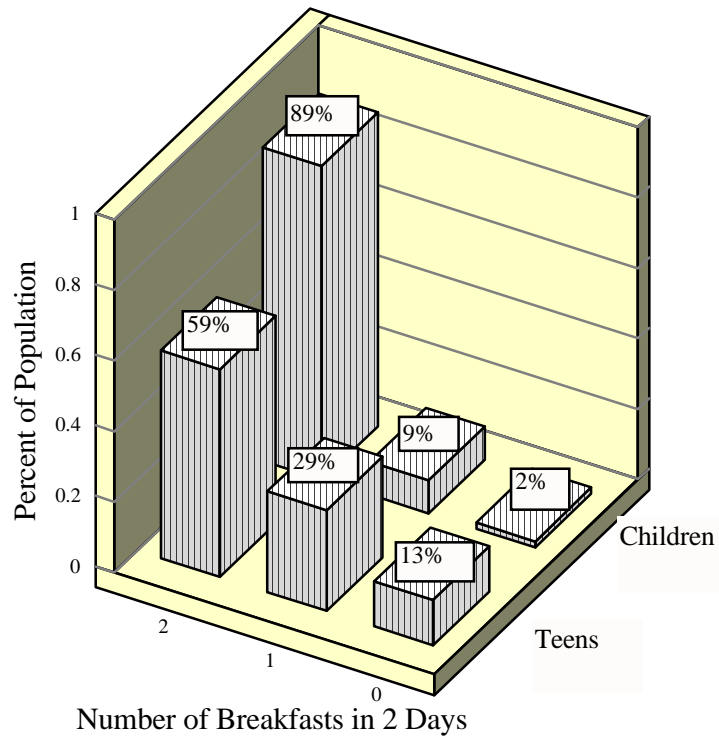
	CSFII-1994	1990 Census
<b>Household Income</b>	\$40,440	\$43,133
Northeast (19.8 percent)	41,343	47,938
Midwest (23.6percent)	41,023	41,597
South (34.6 percent)	37,738	39,987
West (22.0percent)	43,249	45,595
<b>Household Size</b>	3.0	2.6
Northeast	2.8	2.6
Midwest	2.9	2.6
South	2.9	2.6
West	3.4	2.7
<b>Race</b>		
White	77.9%	80.3%
Black	12.7%	12.1%
Asian, Pacific	3.5%	2.9%
Native American	0.6%	0.79%
Other	5.3%	3.9%
<b>Sex</b>		
Female	51.1%	51.3%
Male	48.9%	48.7%
<b>Employment Status<sup>2</sup></b>		
Full Time	33.8%	35.6%
Part Time	10.7%	12.3%
Employed, Not at Work	2.1%	N/A
Not Employed	29.6%	29.2%
Child or indeterminable	23.8%	22.9%
<b>Urbanization</b>		
MSA, Central City	35.0%t	31.7%
MSA, Not Central City	45.4%	31.9%
Non - MSA	19.7%	36.4%
<b>Education<sup>3</sup></b>		
Less than High School	16.3%	18.3%
High School or GED	25.2%	22.4%
1 - 3 Years College	16.9%	19.9%
4 Years College	8.5%	9.1%
5 or More Years College	9.3%	4.7%
Child or not asked	23.6%	22.7%

1. The CSFII caps the reported income at \$100,000. According to the U.S. Census Bureau, in 1994 the mean of the highest income quintile was \$105,945. The authors believe this cut off explains why the survey data average income is lower than the census.

2. Census employment figures are for 1995.

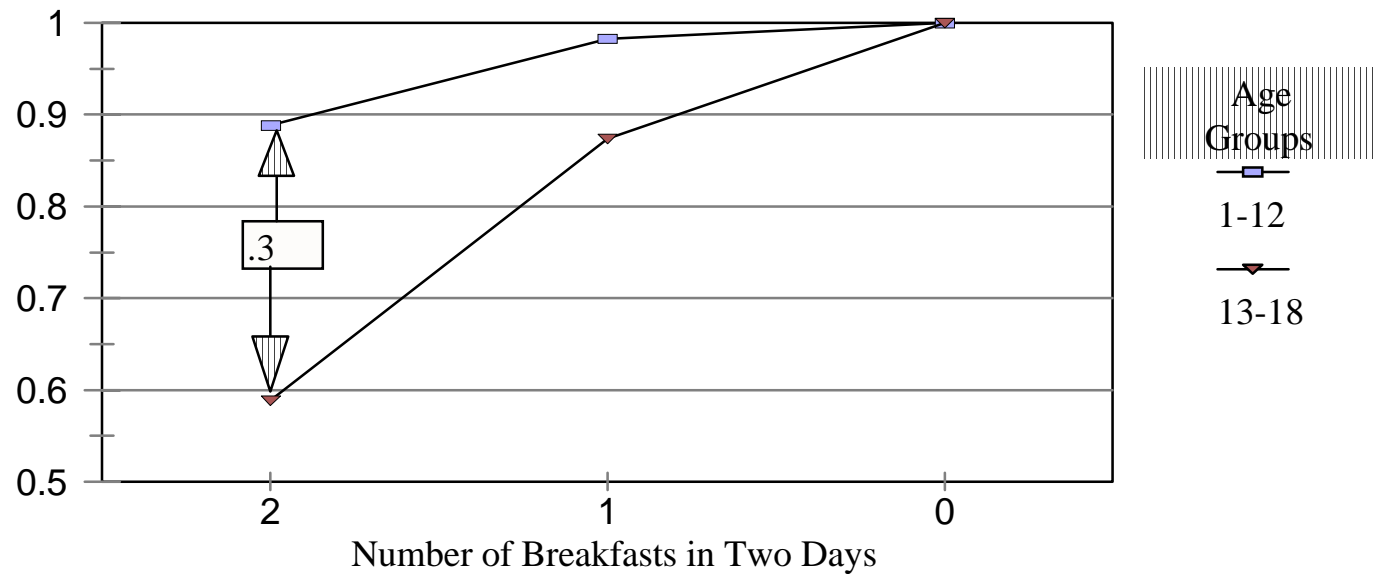
3. The CSFII lists the number of years of college, while the census lists degrees received. In this table, persons who attended some college, but did not receive a degree are listed as 1-3 years of college in the census column, but are listed by the number of years of college actually attended in the CSFII column. In the census column, persons who have received a bachelors degree appear in the 4 years of college. Persons with at least some graduate school are listed in the 5 or more years of college.

## Two Distributions of Number of Breakfasts



**Figure 3** Distribution of the number of breakfasts eaten in two days. The distribution shows how the breakfast habits of each age group break down. For example, 59% of teenagers ate breakfast on both days of the survey, 29% ate breakfast on only one day, and 13% did not eat breakfast on either day. Note: numbers do not add to 100% due to rounding.

# Two Cumulative Distributions



**Figure 4** Cumulative Distributions. In the cumulative distribution, the percent of the age group which ate 1 breakfast is added to the percent of the age group which ate 2 breakfasts. For example, to calculate the value of the cumulative distribution for teenagers (ages 13-18) at one breakfast, add the 59% of teenagers (ages 13-18) who ate breakfast on both days to the 29% of the teenagers who ate breakfast on one day, for a total of 88%. The Kolmogrov-Smirnov test for statistical independence compares the two cumulative distributions and finds the largest separation, which in this case is 30%.



## Cluster Analysis

This study used cluster analysis to group people into clusters or groups based on similarities of behavior with regard to where they obtained their food. In this case the cluster variables were the percent of food, measured in grams, consumed by adults, that came from various retail sources. For example, suppose one person's diet is comprised of 80 percent of food from stores, 5 percent from fast food and pizza restaurants, 10 percent from restaurants, and the remaining 5 percent from cafeterias. Cluster analysis uses these numbers to put that person in a group with others who have similar consumption patterns. The two non-parametric tests described above provide some insight into how each group differs from the rest of the population in terms of demographic variables and eating patterns.

This analysis used the "k-means" method of clustering as implemented by the *SAS Fastclus* procedure. Some researchers criticize k-means because the order of the data affects the final groupings, as will be described below. It is however, one of the better techniques available for clustering large data sets where the goal is to divide respondents into manageable and meaningful groups which can describe behavior. The k-means algorithm selects the centers of the initial clusters, from the first observations in the data set. For example, if 50 clusters are needed, k-means takes the values of the cluster variables (in this case, the sources of food) from the first 50 observations as the initial cluster centers. K-means then assigns the other observations to the "nearest" cluster, using an Euclidian distance function. When an observation is added to the cluster, k-means calculates the mean of the cluster variables, and the mean becomes the new cluster center. If this recalculated cluster center changes which cluster is closest for another

observation, then k-means moves that observation to the cluster it is now closest to and recalculates the center of its new cluster. The process continues until the number of changes is very small.

More specifically, k-means cluster analysis begins with an  $n$  by  $m$  matrix of observations,  $X$ , where  $n$  is the number of observations, and  $m$  is the number of cluster variables. Let  $k$  be the number of clusters desired. Define  $C_1, C_2, \dots, C_k$  as the initial set of clusters. An observation  $x_i$  ( $i = 1, 2, \dots, n$ ) is assigned to cluster  $C_s$  ( $s = 1, 2, \dots, k$ ) if:

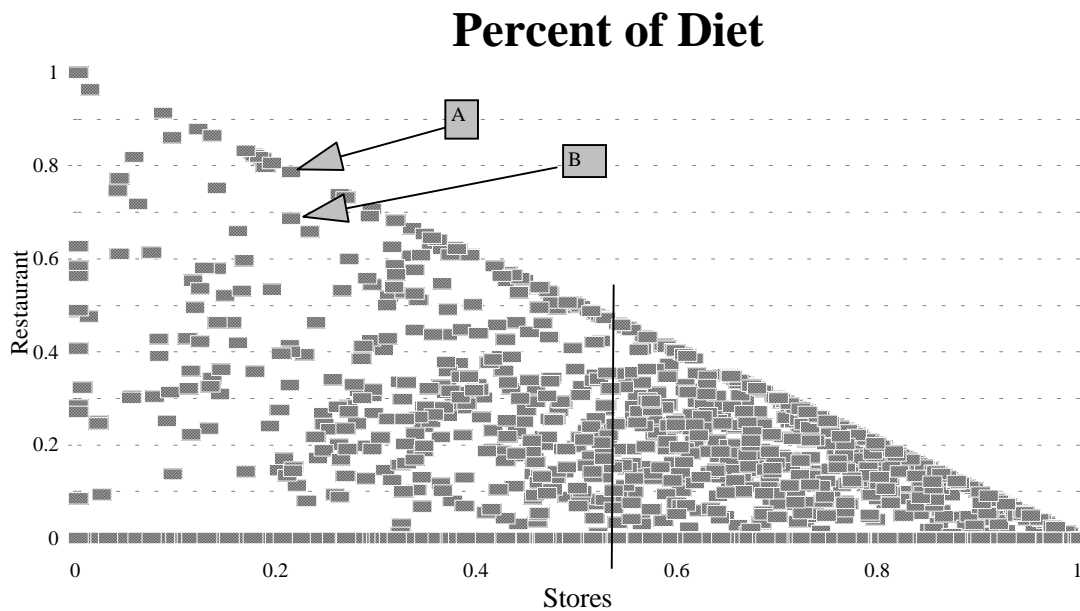
$$(x_i - \bar{c}_s) / (x_i - \bar{c}_s) = \min (x_i - \bar{c}_j) / (x_i - \bar{c}_j) \quad \forall j = 1, \dots, k$$

where  $\bar{c}_s$  and  $\bar{c}_j$  are the means of clusters  $C_s$  and  $C_j$  respectively (MacQueen, 1967). Since the initial centers for the clusters are chosen from the first observations in the data set, the order of the data matters. For example, consider a person who gets 100 percent of his/her food from a garden. If this observation appears in the beginning of the data set, it becomes a temporary cluster center, and k-means will keep this as a cluster, even if there are no other observations near it, ending the process with a cluster with one observation. On the other hand, if the observation happens to fall later in the data set, k-means assigns it to another cluster with more members, perhaps one where the cluster mean has 30 percent of the food from gardens. In the second case, the single member cluster of 100 percent garden food, did not form, though most likely another single member cluster would form based on some other consumption pattern. To correct this problem, this analysis created 50 clusters using the *SAS Fastclus* procedure, and then eliminated observations in clusters with only one or two members. Then the analysis used the means of the remaining clusters as the initial centers (SAS Institute, 1989). In the second round, only 24

clusters formed. As will be described below, that was further reduced to 19 clusters. Once the final 19 clusters were set, this analysis tried adding back the 100 (out of 1,864 total observations) eliminated observations to the final clusters. In some cases, this substantially changed the cluster means, indicating the observation was not close to any cluster. (Recall k-means adds the observation to the cluster it is most alike, even if the observation and the cluster are quite different.) Since the goal of using cluster analysis is to put the observations into meaningful groups, this analysis assumed the 100 observations (5.4 percent of the sample) did not fit into any identified cluster, and omitted them from this phase.

With cluster analysis, the distances are sensitive to the scale of the cluster variables, especially variables with a large variance. There are two steps to correct the problem. First, this analysis used the percent of grams of food eaten from each source, rather than the total number of grams from each source. Second, the analysis computed the principal components of the percentages to use as the actual cluster variables.

Consider a simple example of principal components. Imagine only three cluster variables, say percent of total grams consumed from stores, restaurants, and other sources. The data are plotted in Figure 5. Note that both axes are only of length one, and most of the data are grouped into one small triangle to the right of the vertical line which was positioned by a visual inspection of where the data are on the graph. The data are very compact. Principle component analysis rotates the axes so they go through the widest part of the data. This allows the same data to appear more spread out. The benefit of using principal components of the data,



**Figure 5** A scatter plot of the percent of diet which comes from each source, before principle component analysis is applied. Note that observations along the line from (0,1) to (1,0) receive all their food from a combination of stores or restaurants. For example, the person whose diet is represented by point A, gets about 20% of his or her food from stores, and 80% from restaurants. Observations below this diagonal line get some food from other sources. For example, the person represented by point B gets just under 20% of his or her food from stores, 70% from restaurant, and 10% from some other source. Persons whose habits are represented by observations along the horizontal ("Stores") axis did not eat in restaurants on the two days of the survey. Note that the majority of observations are in the small triangle to the right of the vertical line.

rather than the cluster variables themselves, is that it greatly reduces the effect of a large variance in one variable on the final cluster. For example, the variance of the percent of total grams which came from “other people” is quite high relative to its mean. If this analysis had not used principal components, the percent of the diet which came from the “other people” variable would have had almost as strong an influence on the clusters as “stores,” a much larger supplier of most Americans’ diets.

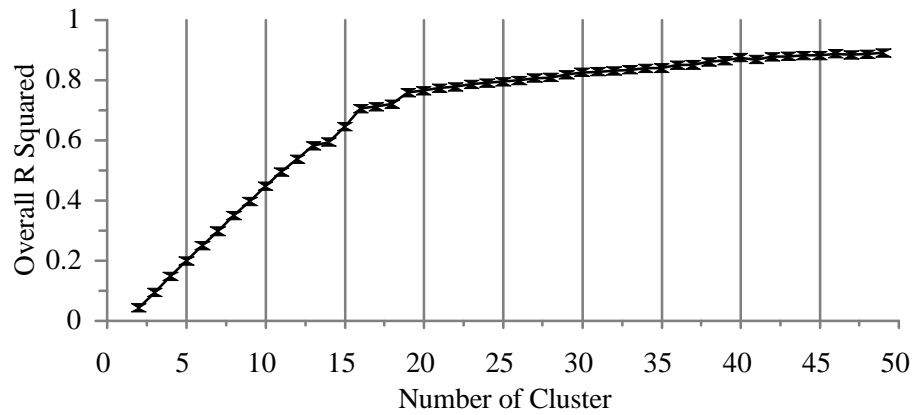
The sample includes 16 different food sources, leading to 15 principal components. The

first principle component axis in the study compared the percent of food consumed and purchased at stores to the percent purchased at all other locations. The second measured consumption from restaurants, taverns, and other people against consumption from fast food and pizza, cafeterias, and vending machines. The third measured restaurant consumption against consumption from fast food and pizza establishments, taverns, and vending machines.

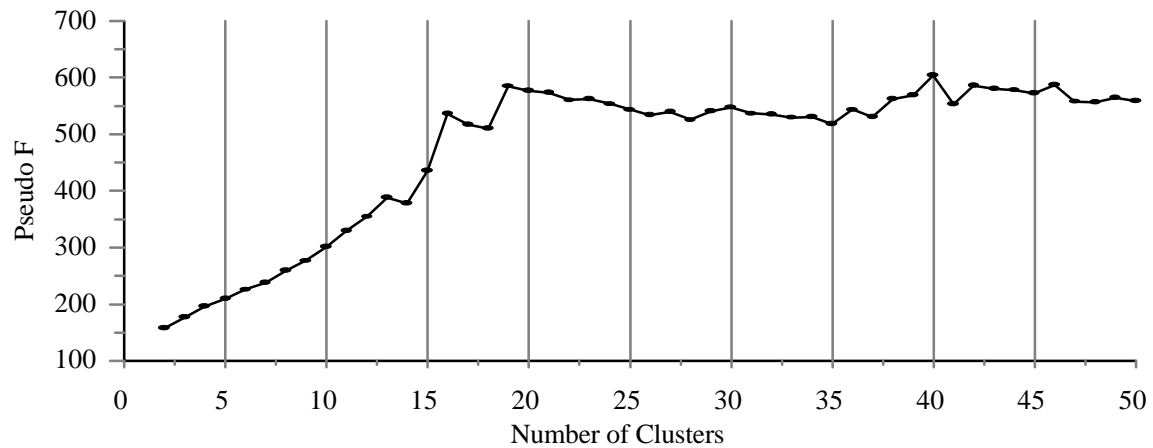
A major question to address in cluster analysis is what is the appropriate number of clusters. Hatrigan (1985) points out that while there is no one satisfactory way to determine the final number of clusters, there are some important criteria. At best, one hopes that the final number of clusters is independent of the initialization process and that it delivers a meaningful set of clusters which are easy to interpret.

There are some additional guidelines to help analysts determine the number of clusters. The Pseudo-F test measures the weighted ratio of the dispersion within each cluster (that is, the largest distance between any two observations in the cluster as measured by the Euclidian distance function) to the dispersion of the entire sample (largest distance between any two points in the entire sample). As one increases the number of clusters, the Pseudo F-statistic rises to a peak, then falls. Often there is more than one peak. The second guideline for determining the number of clusters is the overall  $R^2$  which measures the probability of predicting a cluster variable given the mean of the cluster. Once this analysis removed outliers, the next step was to combine clusters which were close and compared Pseudo-F values of results with different numbers of clusters. This analysis tried from 12 to 50 clusters. As one increases the number of clusters, the Pseudo-F statistic rises to a peak, then falls. The number of clusters with the highest Pseudo-F value is the best arrangement under this criteria. Plots of the Pseudo-F and overall  $R^2$  measures

for this analysis are shown in Figures 6 and 7. The peaks in the Pseudo-F graph (Figure 7) suggest that either 19 or 40 clusters produce the most repeatable results. Since there are only 16 total sources of food, the smaller number is more appropriate for this analysis. The overall  $R^2$  measure (Figure 6) rises, then levels off at 19 clusters. This further suggests that 19 is the appropriate number of clusters to use.



**Figure 6** Overall  $R^2$  for Different Numbers of Clusters. This graph has a turning point at 19 clusters, suggesting that 19 clusters is an optimal number. This result is also shown in figure 7.



**Figure 7** Pseudo F Statistic for Different Numbers of Clusters. The peaks in the Pseudo F suggest optimal numbers of clusters. There are peaks at 16, 19, and 40 clusters. Since the peak at 19 is higher than the one at 16, and 19 clusters is more manageable than 40 clusters, this analysis uses 19 clusters. Note that this confirms the result in Figure 6.

# **Food Purchasing Patterns**

## **Where Do People Obtain Their Food?**

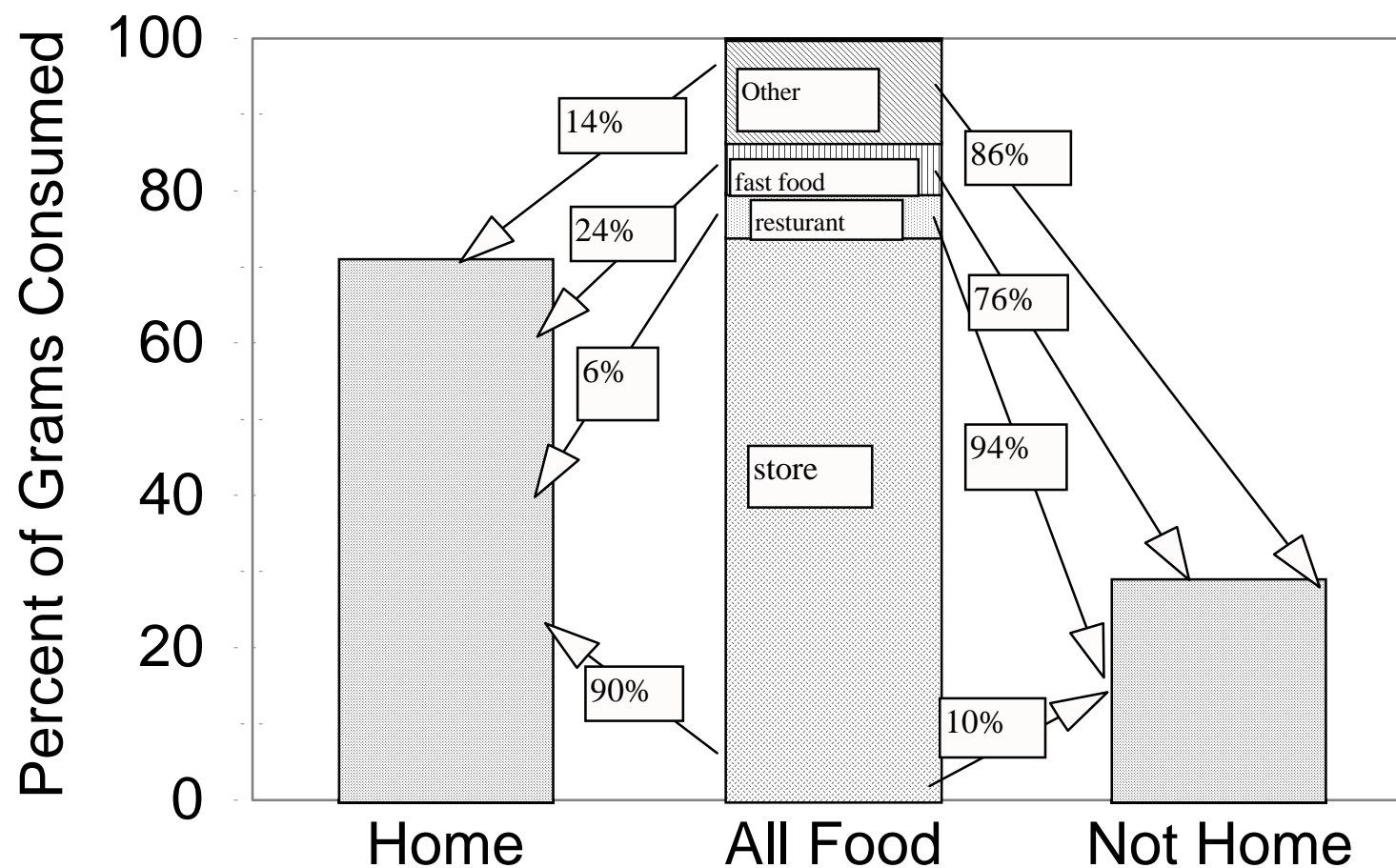
In 1994, Americans obtained almost three-fourths (72 percent) of the mass (grams) of food they ate at retail food stores (grocery stores of one size or another). This food also represented about three-fourths of the calories eaten. This 72 percent of food was purchased with only 53 percent of total food expenditures. The 1994 CSFII data indicate the traditional definitions of food at home (expenditures for food in a retail food store) and food away-from-home (expenditures for food outside of a retail food store) is no longer adequate to describe food consumption patterns of American consumers. Individuals in the 1994 CSFII reported eating 10 percent of food purchased in a store somewhere other than at home, and taking 6 percent of restaurant food and 24 percent of fast food and pizza home to eat (Figure 8). Bishop (1997) reports that over half of the food purchased at commercial establishments is taken somewhere else to eat. Consumers in this study reported taking some portion of take-out food somewhere other than home to eat.

There were substantial differences in the food purchasing patterns among the population. The factors which made the most difference were the age of the consumer, and to a lesser extent the household composition, size, and income. In general, households with children purchased more of their food in stores than the population as a whole. The two exceptions to this trend were adults over age 50 with children, and single parents age 30-39 who obtained more of their food from restaurants and fast food and pizza establishments. Both groups were financially better



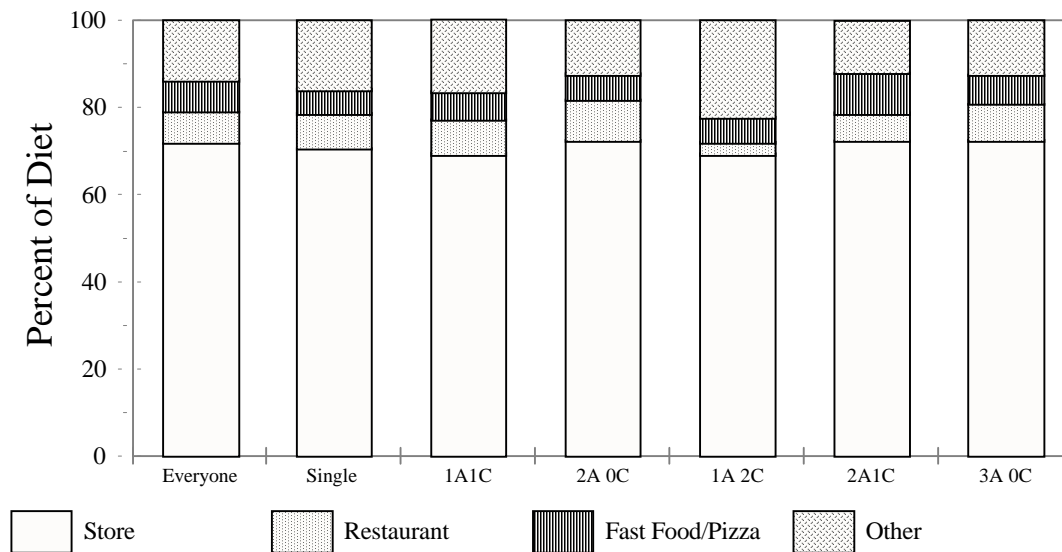
# Where food is consumed

## By Source



**Figure 8** The traditional assumption claims that food purchased in stores is eaten at home, and all other food is eaten away from home. The chart shows that 90% of food consumed from stores is eaten at home. In addition, 24% of fast food, 6% of restaurant, and 14% of 'other' is eaten at home.

## Food Source by Household Composition



**Figure 9** C stands for children, A stands for adult

## Food Source by Income

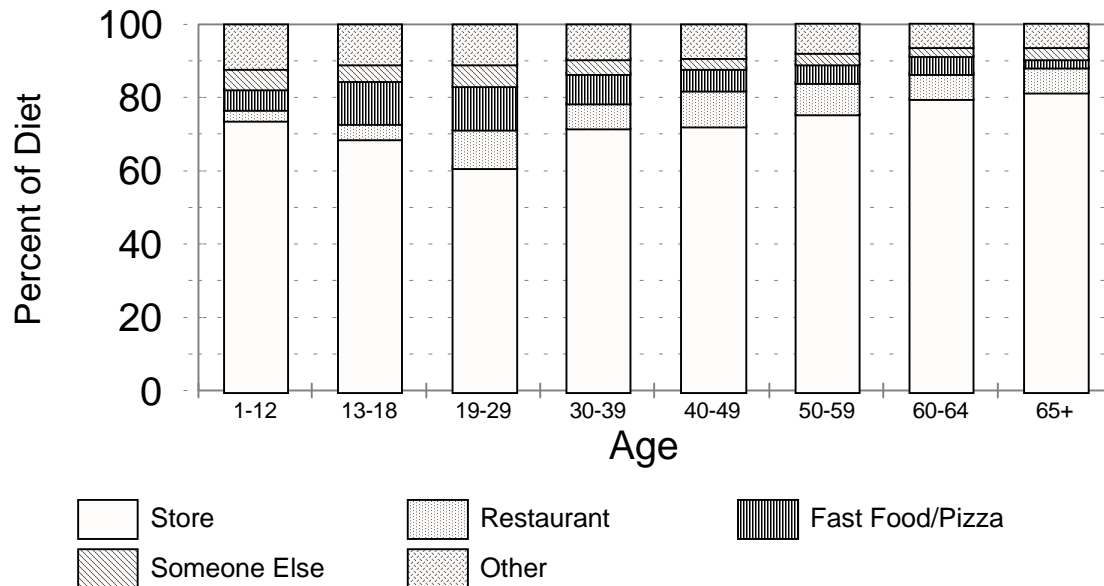


**Figure 10**

off than younger parents, and appear to spend their money to avoid cooking. As shown in Figure 9, single parent households, especially those with two children (1A, 2C), obtained a very small percent of their food from restaurants, and fast food and pizza establishments, and significantly more from other sources, which includes other people. Single person households of all ages consumed more food from restaurants and fast food and pizza establishments than the average for each age group. This may imply that single person households socialize more out of the home; it tends to confirm a conventional wisdom that single people rarely cook for themselves. One of the more interesting stories to draw from Figure 9 is the persistent and consistent use of retail food stores as the primary source of food. In all household arrangements shown, people obtained an average of 69--73 percent of their food from grocery stores. The largest variation is in "Other" food sources which ranged from 12 percent for households with two adults to 22 percent for households with one adult and two children. The variation is even less pronounced when examining food consumption patterns by income (Figure 10). The low income group obtained 76 percent of their food from stores, while the high income group obtained 71 percent. As income rose, people substituted some food from stores with fast food, pizza, and other restaurants. The differences in source of food between household composition and income, were dwarfed by the impact age had on the source of food (Figure 11). Stores ranged from 59 percent for young adults (ages 19--29) to 81 percent for persons age 65 and above. Recall that the national average was 72 percent. Young adults and teenagers made up some of the difference with fast food and pizza establishments, and the rest by eating in restaurants. Not surprising, the oldest group, over 65, obtained only 2 percent of their food from fast food and pizza establishments.

# Food Source

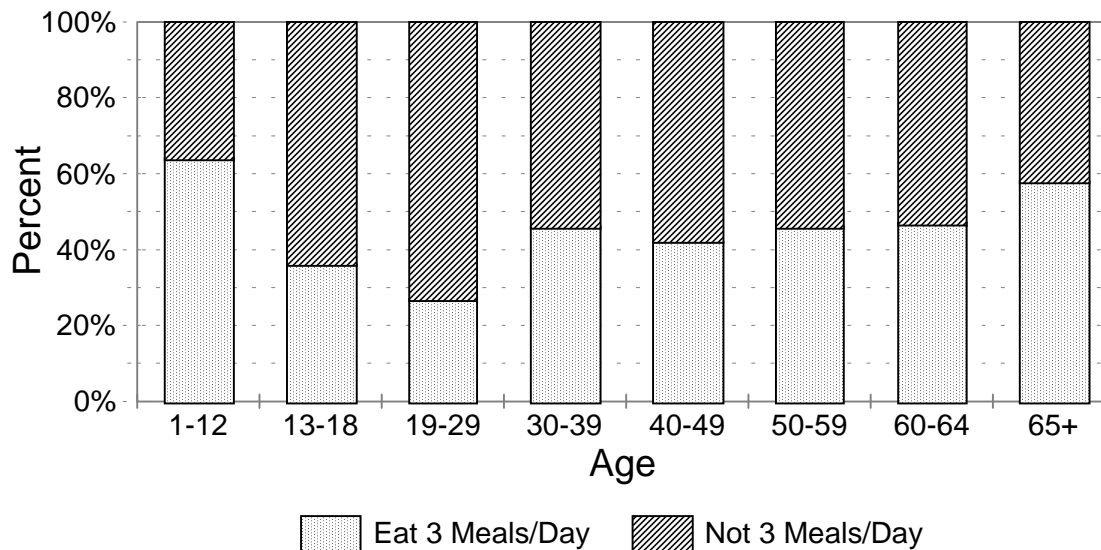
By Age



**Figure 11** Age impacts where people buy food. Young adults (ages 19-29) get less food from stores (59%) than any other age group. This group makes up the difference by obtaining food from other people. Persons over the age of 65 get the most food from stores (81%).

# Daily Meal Pattern

By Age



**Figure 12** Children ages 1-12 are the most likely to eat 3 meals per day, while teenagers, and young adults (ages 19 - 29) are the least likely. After age 30, 40-50% of adults eat three meals per day.

## When and How Do People Eat?

Nutrition experts suggest that three meals a day leads to more variety in the diet and thus a better chance of a well-balanced diet (Morgan, 1986). In this study, people were counted as eating three meals a day if they ate breakfast or brunch, lunch or dinner at midday, and either supper or dinner in the evening on both days of the survey. If the respondents classified a meal as a snack, it was not counted as a meal. In this data set, 46 percent of respondents ate three meals per day. Meal patterns also varied by age and household composition. Children and households with children were more likely to eat three meals a day. Households headed by males-only were the least likely to eat three meals per day (38 percent), while two parent households were the most likely to eat three meals per day (45 percent). As seen in Figure 12, 64 percent of children ate three meals per day; this number drops significantly for teenagers (age 13-18) and young adults (19--29), then rose with age to 40--45 percent.

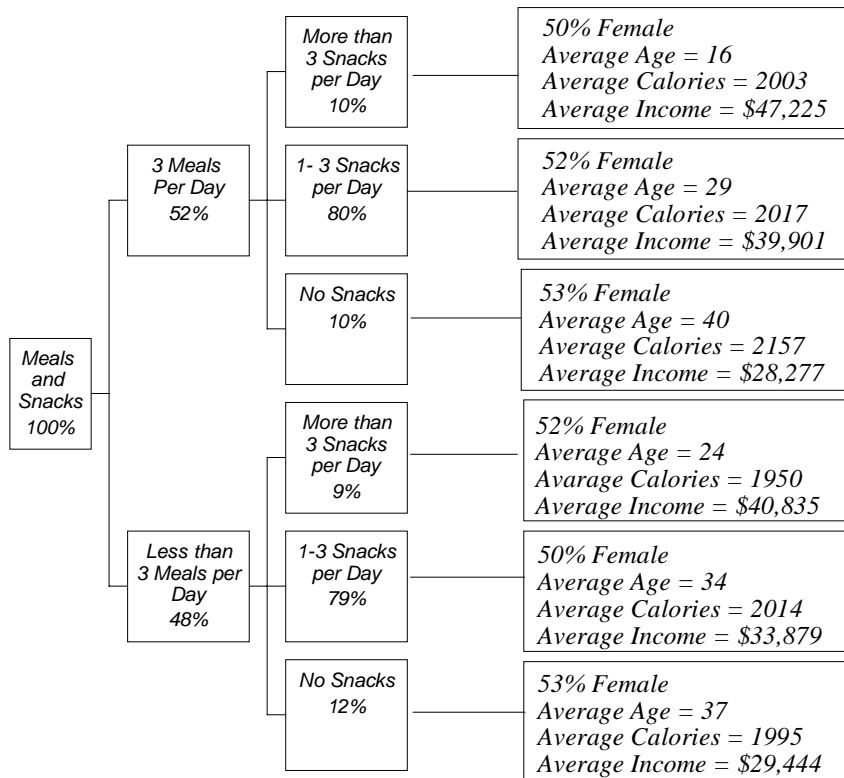
People who ate three meals a day ate 57 percent of their daily calories between 4 A.M. and 4 P.M., while those who did not eat three meals a day only ate 53 percent of their calories between these times.<sup>4</sup> Most people ate breakfast or brunch between 6 A.M. and 11 A.M. with 8--9 the most popular time. The midday meal<sup>5</sup> peaked between 11 A.M. and 3 P.M., where noon to 1 P.M. has the highest volume, and the evening meal was most common between 5 P.M. and 8 P.M., with 6 -- 7 P.M. the most popular time. The pattern varies with age. Teenagers ate

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<sup>4</sup> In the survey many people classified their midday meal as “dinner.” This study defines any dinner eaten before 4 P.M. as the midday meal and after as the evening meal. Thus calories consumed between 4 P.M. and 4 A.M. include the evening meal and snack(s).

<sup>5</sup> Any brunch eaten after 1 P.M. was defined as a midday meal.

# Demographic Composition of Meal and Snack Patterns



**Figure 13** Demographic composition of selected meal and snack patterns. This tree breaks down the meal and snack patterns studied in this paper. For example, 52% of the persons in the sample ate three meals per day. Ten percent of these 52% ate more than three snacks per day, 80% ate 1-3 snacks, and 10% did not eat snacks. The average age for the people who ate 3 meals per day, and more than 3 snacks per day is 16.

breakfast earlier (7--8 A.M.), perhaps reflecting an early start time for high school. Young adults ate breakfast between 9--10 A.M. Both age groups ate dinner later (7--8 P.M.).

A significant part of the American diet is snacks. Over 78 percent of the respondents ate between one and three snacks per day, and 6 percent ate over three snacks. Figure 13 shows the demographic composition and average caloric intake and average household income for selected meal and snack patterns. Younger people, especially teenagers and children, tended to snack more than older people. For example, the average age of those who ate three meals a day and over three snacks a day was 16 years, whereas the average age of those who ate three meals a day and no snacks was 40 years. Young people may not be able to meet their daily nutritional and energy needs by simply eating three meals a day. Income was positively correlated with the number of snacks eaten. The average household income of those who ate three meals and more than three snacks was \$47,225 compared to \$28,277 for those who ate no snacks.

Bowman (1997) finds an increase in the average consumption of certain snack foods with income. These include grain-based salty snacks (corn chips or pretzels), fruits and fruit juices, yogurt, carbonated soft drinks, coffee, tea, alcoholic beverages, and candies. On the other hand, the consumption of potato chips, fruit drinks, and whole milk decreases with higher income. This study found the total daily intake of calories did not increase with the number of snacks. A probit regression used to analyze the effects of TV-watching, age, and income on snack consumption showed income was the most significant variable, but snack consumption also increased with increased TV-hours and decreased with age.

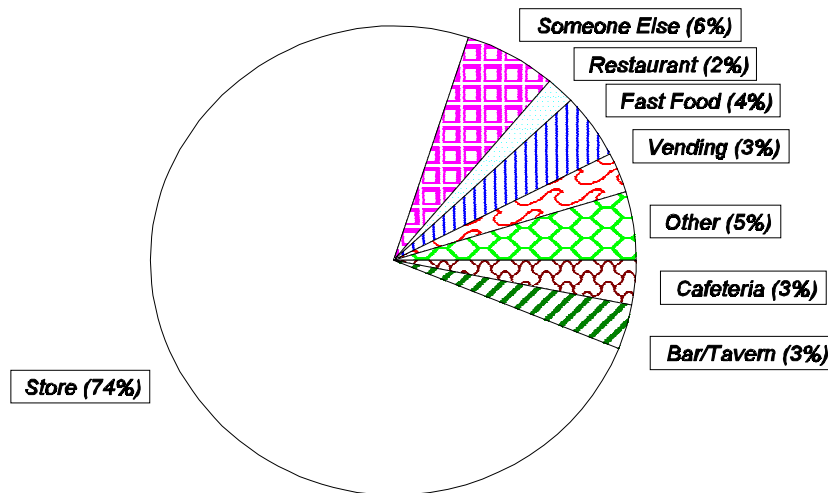
Where do people purchase their snack food? Figure 14 shows the market share each retail food source had of the total snack food consumption. Although 75 percent of snack food consumed was purchased in stores, only 68 percent was actually eaten at home. This finding also

refutes the traditional assumption that food from stores is eaten at home. In addition to these numbers, it is interesting to note that only 48 percent of all vending machine food was consumed as snack food; similarly, 60 percent of bar and tavern food, 20 percent of store food, and 26 percent of mail order food was consumed as snacks.



## Market Share of Snacks

(Measured in g)



**Figure 14** (Figure 3) The market share each source occupies in food consumed as snacks. Consumers purchase in stores 74% of the food they later consume as snacks.

## Clusters of Food Consumers

As discussed in the methodology section, this study found 19 to be the optimal number of clusters. The 19 clusters were further classified into 12 groups, based on the main sources of food for each cluster. For example, there were three clusters where fast food and pizza establishments provided a much larger share of the diet than these sources did for the rest of the individuals in the data set. These three clusters were combined into the Fast Food group. The names assigned to the groups were meant to describe the people in the group. For example, the High Service people are those for whom a large part of their diet comes from restaurants; people in the Office group received a large share of their diet from non school cafeterias, while those in the Student and Faculty group ate more food from school cafeterias than others in the population. The 12 groups from the 19 clusters, with the source of food which sets them apart from the rest of the consumers in the data set are shown in Table 2. This table also identifies the percent of the adults in the sample that clustered around a particular food source. For example 10 percent were significant users of restaurants and almost 15 percent were frequent users of fast food/pizza establishments.

Table 3 shows the average percent of total grams of food people in each cluster obtained from each retail source. The bolded numbers in Table 3 identify the behavior around which the cluster was formed. For example, the Home Cookers (49 percent of the sample) obtained, on average, 93 percent of the food they consumed from a store. The High Service cluster obtained 42.8 percent of the food they consumed from restaurants, and 46.8 percent from stores. At the other end of the spectrum, the two smaller clusters in the fast food group (total of 3.7 percent of the sample) obtained only 35 percent of their food from a store. Bear in mind that the

**Table 2: Clusters of Consumers by Common Food Source**

Group		percent of Adults	Group Name Food Source <sup>1</sup>
Home Cookers		49	Store
Fast Food	A	11	Fast Food/ Pizza
	B	3	
	C	0.7	
High Service		10	Restaurant
Muchers		6	Someone Else/ Gift
Gardner	A	4	Grown or Caught
	B	1	
Quarter Spenders		4	Vending Machine
Office	A	2.4	Other cafeteria
	B	2	
	C	0.7	
Students and Faculty		1	School Cafeteria
Common Coffee Pot	A	2	Common Pot or Tray
	B	0.2	
Pubs		2	Bar, Tavern, Lounge
Public	A	0.5	Care Center, Soup Kitchen, Meals on Wheels, Residential Facility, Other program
	B	0.4	
Catalog		0.4	Mail Order

<sup>1</sup> Group Name Food Source refers to the source of food, as stated in the data set, which sets the group apart from the other groups or cluster.

**Table 3: The Percentage Share of Food Source by Cluster**  
(measured in grams)

Group		perce nt of Adult s	Store	Resta urant	Fast Food	Other People	Home Grown	Ven ding	Cafete ria <sup>1</sup>	Common Pot	Bars/ Taverns	Mail Order	Public <sup>2</sup>
Home Cookers		49	<b>93.1</b>	2.5	1.1	1.4	0.1	0.3	0.1	0.1	0.1	0	0.1
Fast Food	A	11	69.6	3.3	<b>22</b>	1.5	0.1	0.3	0.2	0.1	0.1	0	0.1
	B	3	34.8	3.7	<b>57.3</b>	2.4	0.1	0.1	0.2	0	0.1	0	0.1
	C	0.7	33.8	8.2	<b>40.4</b>	0.1	0.3	14.2	0.8	0	0.3	0	0
High Service		10	46.8	<b>42.8</b>	5.0	1.8	0.1	0.4	0.4	0.1	0.4	0	0
Muchers		6	51.2	4.8	4.2	<b>36.3</b>	0.4	0.3	0.8	0.4	0.3	0	0.1
Gardner	A	4	81.7	3.4	2.5	1.3	<b>9.4</b>	0.3	0.3	0	0	0	0
	B	1	62.5	5.3	2.4	2.5	<b>24.6</b>	0.6	1.1	0	0.5	0	0.1
Quarter Spenders		4	61.1	7.2	5.6	3.4	0.1	<b>18.7</b>	2.0	0.4	0.3	0	0
Office	A	2.4	72.6	4.2	3.8	1.3	0.3	0.7	<b>14.7</b>	0.2	0.3	0	0
	B	2	52.7	7.3	4.3	3.0	0.3	1.0	<b>28.1</b>	0.3	0.2	0	0
	C	0.7	27.9	7.0	7.3	2.4	0	2.6	<b>52.8</b>	0	0	0	0
Students and Faculty		1	54.2	8.3	6.8	1.2	0	1.1	<b>25</b>	0.2	0.8	0	0
Common Coffee Pot	A	2	65.1	7.9	4.6	2.5	0.2	2.3	0.7	<b>14.6</b>	0.6	0	0.1
	B	0.2	39.4	11.6	6.7	2.6	0.2	2.2	2.0	<b>32.8</b>	0	0	0
Pubs		2	51.6	7.1	8.2	3.7	0.2	1.2	0.7	0.1	<b>26.6</b>	0	0
Public	A	0.5	83.8	0.1	1.9	2.2	1.5	0.5	0	0	0	0	<b>9.5</b>
	B	0.4	68.1	0.9	1.1	4.2	0.2	1.0	1.8	0	0	0	<b>21.6</b>
Catalog		0.4	81.5	1.9	6.6	2.3	1.3	0.2	0	0	0	<b>5.1</b>	0

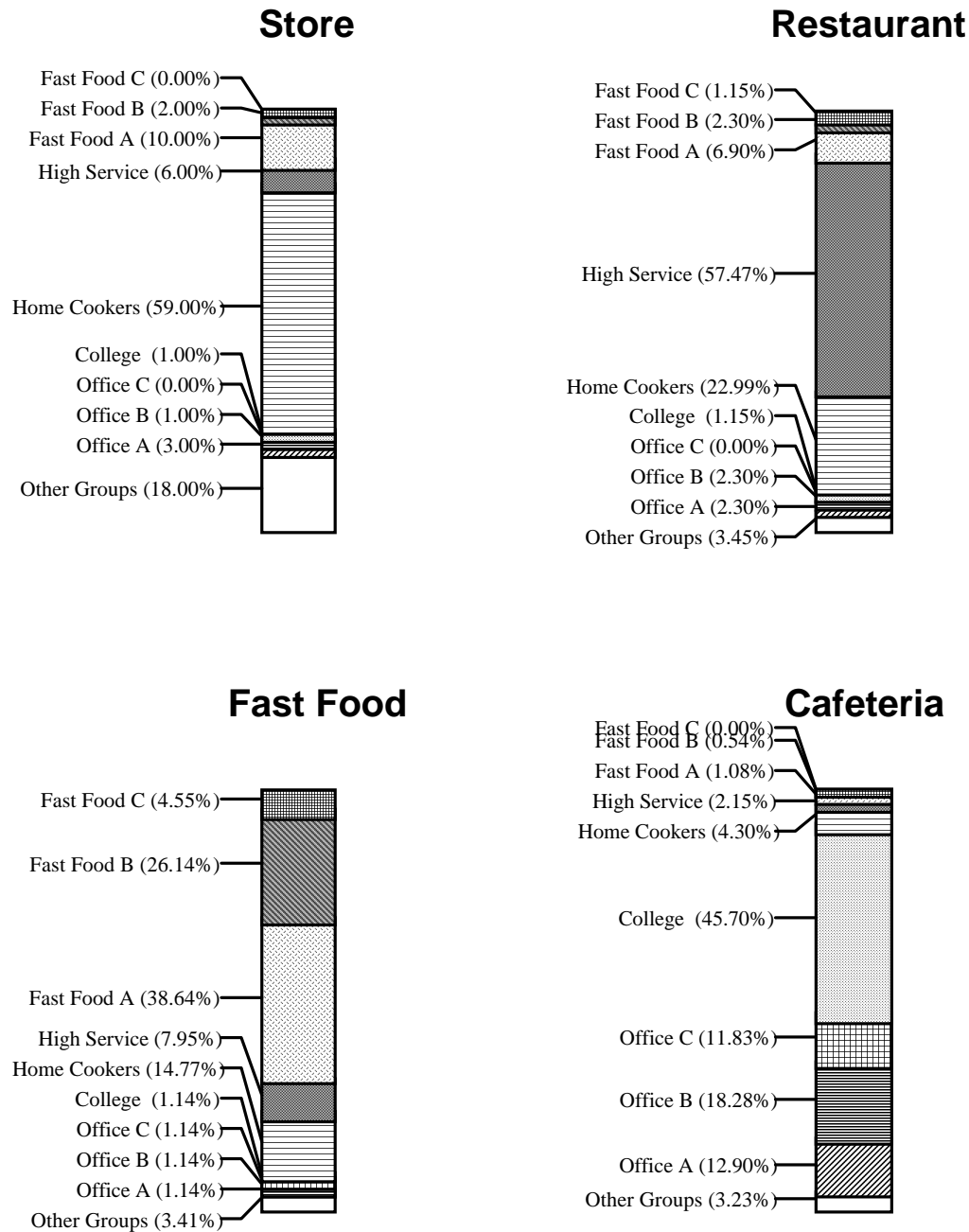
<sup>1</sup> Cafeteria includes both school and other cafeterias.

<sup>2</sup> Public includes Care Facility (adult and child), Meals on Wheels, Soup Kitchens Residential Care Facilities, and "other public programs."

consumption data are over two non consecutive days, and should not be taken as representing eating patterns for every day for an individual person. In other words, the people in the fast food group may not actually have eaten fast food every day of the year, they just happened to do so on the two days they participated in the survey. The analysis does tell us that on a given day, just under 15 percent of U.S. adults in 1994 fit into the Fast Food group. The High Service cluster actually obtained a larger share of its diet from stores than restaurants, but is separated from stores because members obtained a higher percent of their food from restaurants than those in the Home Cookers cluster.

Figure 15 is the result of reversing the question and asking what portion of food sold at four major types of retail food outlets (stores, restaurants, fast food and pizza restaurants, and cafeterias) was purchased by people in each cluster. The Home Cookers cluster consumed 59 percent of all food obtained from stores by this sample of consumers. This reflects the fact that they made up almost half of the sample, and obtained over 90 percent of their food from stores. This cluster also consumed 23 percent of the restaurant food, which is more than the fast food, college and office clusters combined. Home Cookers made up only 15 percent of the fast food and pizza market, and only 4 percent of the cafeteria market. The cafeteria market includes both school and non school cafeterias. Since the clusters only include adults, the market share of all cafeteria food shown here does not include children eating in school cafeterias. The Student and Faculty cluster ate in school cafeterias, while the office group (43 percent of all cafeteria business ) ate in non school cafeterias.

# Market Share by Cluster



**Figure 15** Market share of four sources occupied by each cluster. For example, 59% of all food from stores is consumed by members of the Home Cookers cluster

## Who is in Each Cluster?

Table 4 illustrates how each cluster differed from the general population in terms of demographic variables, and the meal and snack eating patterns. The variables tested included age, race, sex, income, education, region of the country, level of urbanization, employment status, occupation, household size, and the meal and snack patterns. Since these variables are categorical, the statistical test used to compare each cluster to the rest of the adult sample was the Kruskal-Wallis test, which measures differences in the distribution of the categorical variable between two groups. The p-value of the test appears in each cell in Table 4 where there is a statistically significant difference between the people in the cluster and the rest of the sample. The lower the p-value, the greater the difference. The descriptions of the difference in each cell (e.g., “younger”) are based on a visual inspection of the distributions. The Kruskal-Wallis test does not give information on how the distributions are different, only that they are different. If the cell is blank, the p-value is greater than 0.05, implying the cluster and the rest of the sample are drawn from similar populations. It is important to note that these are differences in distribution, not a full description of everyone in the cluster. For example, the table indicates that the Home Cookers cluster has lower incomes. This means that the lower income group is concentrated in this cluster, but there are middle and high income persons in the Home Cookers cluster as well.

**Table 4: Demographic Characteristics of Clusters**

	Home Cookers	High Service	Fast Food			Office			College and Faculty
			A	B	C	A	B	C	
Age	older (0.0001) <sup>1</sup>		Younger (0.0001)	Younger than A (0.0001)	Younger than B (0.0001)				
Race		More Anglo (0.0066)		Less Anglo (0.020)					More Asian/Pacific and “other” (0.0004)
Sex		More Men (0.0281)							Less female (0.0359)
Meal Pattern	Not 3 meals/day (0.0327)	Not 3 meals/day (0.0116)	Not 3 meals/day (0.0040)	More no snack and more 3 meals/day (0.0001)		Over 3 snacks /day (0.0033)			More 3 meals/day (0.0359)
Income	Lower income (0.0001)	Higher income (0.0001)			Higher income (0.0058)		Higher income (0.0001)		
Education	Less college (0.0001)	More college (0.0001)	More “some college” (0.0393)		More college and graduate study (0.009)		More college /university (0.0097)		More college, and graduate (0.0001)
Occupation	Fewer professional/ technical, and manager/ proprietor (0.0051)	More professional/ technical, and manager/ proprietor (0.0297)					More professional/ technical, manager/ proprietor (0.0202)		
Employment	More not employed (0.0001)	More full time (0.0094)	More full and part-time (0.0004)	More full and part-time (0.0214)	More full time (0.0001)	More full time (0.0010)	More full time (0.0002)	More full time (0.0014)	More full and part time (0.0214)
Region				More Northeast (0.0018)					More Northeast (0.0018)
Urban							More central city (0.0428)	More central city (0.0321)	
Household Size			Larger (0.0002)						

<sup>1</sup> Numbers in parentheses are the p-values from the Kruskal-Wallis test for a difference in distribution between the cluster, and the rest of the adult sample. A lower p-value indicates the difference is greater. Results are only given if the difference is significant at the 5% level. A p-value of 0.01 or less is required to be significant at the 1% level.



The Home Cookers cluster was older; more people in this group were of retirement age. This helps to explain why more people in the group were not working compared to the rest of the sample. Unemployed persons seek out less expensive ways to buy food and are less pressed for time, both factors lead to using grocery stores more extensively than food service establishments. Since this cluster was nearly half the data set, it is important to remember that there were also many fully employed people in this cluster.

The three Fast Food clusters were all younger than the rest of the sample, but there were differences within these groups. Nearly 51 percent of Fast Food A were under age 40. Unlike the other two Fast Food clusters, 12 percent of Fast Food A were 65 and older, compared to 22 percent of the entire adult sample. The other two Fast Food clusters were even younger. Fast Food B had 41 percent under age 30, and 22 percent between age 30--40, while Fast Food C had 48 percent less than 30, and 30 percent between the ages of 30--40. Neither Fast Food B nor Fast Food C had a significant representation in the 65 and older group. Both Fast Food A and C had more education than the rest of the sample. In fact, Fast Food C had the highest average education level of all clusters.

Table 5 illustrates the demographic profile of the five largest clusters and groups. Virtually all types of individuals appear in all clusters. The standard deviations on income and age are uniformly large. Fast Food C was the most homogeneous group with its high percent of employed people, lower percent of females, and high incomes. However, it comprises only 0.7 percent of the sample population. There were more females and educated people in the Student and Faculty group, who were also more likely to eat three meals a day.

**Table 5: Profile of the Main Clusters**

	Average or Percent			Range			Standard Deviation		
Home Cookers									
Age	51			19-90			17.9		
Income	\$32,554			0-\$100,000			25,362		
Household Size	2.9			1-10			1.63		
Percent Female	51.4			Percent Rural			25.5		
Percent Employed	46.5			Percent 3 Meals/Day			40.5		
High School Degree or More	71.0								
High Service									
Age	48			19-90			17.3		
Income	\$42,767			0-\$100,000			\$27,958		
Household Size	2.8			1-9			1.4		
Percent Female	45.5			Percent Rural			21.0		
Percent Employed	62.1			Percent 3 Meals/Day			32.3		
High School Degree or More	85.6								
Fast Food									
	A	B	C	A	B	C	A	B	C
Age	41.8	36.1	30.7	19-90	19-84	19-60	16.5	14.1	11
Income	\$36,466	\$34,555	\$48,507	0-100,000	0-100,000	13,192-90,000	25,330	26,509	21,043
Household Size	3.2	3.2	3.4	1-9	1-14	1-8	1.6	1.7	1.7
Percent Female	47.8	45.2	34.8	Percent Rural			22.2	22.6	13.0
Percent Employed	65.7	78.3	95.7	Percent 3 Meals/Day			45.8	21.7	21.8
High School Degree or More	82.7	82.61	91.3						
Office									
	A	B	C	A	B	C	A	B	C
Age	49.0	46.8	41.5	20-89	19-87	21-66	16.1	17.0	14.8
Income	\$39,824	\$49,072	35,963	0-100,000	3000-100,000	0-100,000	27,012	28,100	27,181
Household Size	3.0	2.7	2.8	1-9	1-7	1-7	2.0	1.6	1.3
Percent Female	55.7	45.6	52.2	Percent Rural			13.9	15.8	8.7
Percent Employed	73.4	77.2	91.3	Percent 3 Meals/Day			48.1	31.6	26.1
High School Degree or More	76.0	82.5	82.6						
Student and Faculty									
Age	36.8			19-58			13.2		
Income	\$44,361			\$6000-100,000			25,282		
Household Size	3.2			1-6			1.4		
Percent Female	68.8			Percent Rural			28.1		
Percent Employed	87.5			Percent 3 Meals/Day			56.3		
High School Degree or More	90.6								

Industry research indicates that even though Americans like to eat at home, they do not necessarily cook the food at home (Larson, 1998). Table 6 shows that this pattern varied by cluster. Two clusters (Fast Food B and Office C, totaling 4 percent of the sample) ate more at home than they purchased in stores. It is reasonable to assume that most food not purchased in stores is ready-to-eat, or at least ready-to-heat. Thus, at least a portion of the persons included in the sample ate food at home that they did not cook at home. The data do not reveal whether the food purchased in a retail food store was ready-to-eat or ready-to-heat, or ingredients for a home cooked meal. Some of the food from stores is taken out and eaten at home, but the data indicate that between 1 and 7 percent less food was consumed at home than was purchased in a store for all but two clusters in Table 6. These groups include the Home Cookers, High Service, Fast Food A and C, Office A and B, and Students and Faculty - 76 percent of the sample. At least some of the food from stores that was not consumed at home must be ready-to-eat food taken elsewhere or food taken back out of the home for snacks, lunches, potluck events, and other occasions.

### **Diet and Health Knowledge**

Respondents in each cluster also revealed their beliefs and attitudes about diet and health in the Diet and Health Knowledge Survey (DHKS). Only one person from each household responded to the DHKS, and members of the same household could have fallen into different clusters. Table 7 shows attitudes which were significantly different from the rest of the sample, using the Kruskal-Wallis test. People in the Home Cookers cluster were less concerned with the ease of preparation than the rest of the sample. Since this group represents nearly half of the sample, it is an important finding. Industry sources believe that consumers are very

**Table 6: Food Eaten at Home and Food Obtained from Stores by Cluster  
Calculated in Grams**

Cluster	Percent of Food Eaten at Home	Percent of Food Obtained from Stores	Difference <sup>1</sup>
Home Cookers	86	93	-7
High Service	45	47	-2
Fast Food A	67	70	-3
Fast Food B	43	35	8
Fast Food C	33	34	-1
Office A	65	72	-7
Office B	50	53	-3
Office C	35	28	7
Student and Faculty	49	54	-5

<sup>1</sup> Difference is the percent of food obtained from stores subtracted from the percent of food eaten at home. A positive number indicates the average consumer in this cluster bought food from sources other than stores and brought it home. A negative number means, on average, consumers bought food from stores and ate some of it away from home.

**Table 7: Distinguishing DHKS Answers**

Cluster	How answers differ from the rest of the sample <sup>1</sup>
Home Cookers	Less concerned with ease of preparation, more comfortable with food labels
Fast Food A	More likely to believe government definition and enforcement of extra lean is meaningful
Fast Food B	More likely to believe diet just about right in cholesterol (rest of sample believes too high)
Fast Food C	More likely to believe diet just about right in sugar and sweets (rest of sample believes too high)
High Service	Less concerned about price
Office A	More likely to look for nutrition information when buying frozen dinners
Office B	More likely to believe diet is just about right in calories (rest of sample believes too high)
Office C	
Students	

<sup>1</sup> Shows respondents answers to the Diet and Health Knowledge Survey which were significantly different from the rest of the adult sample. A blank cell indicates no answers were significantly different from the rest of the sample.

interested in meals which are easy to prepare. As discussed above, members of this group are more likely to be in the low income group, the group some food retailers are beginning to recognize as “being left behind” in the trend toward more ready-to-eat or ready-to-heat meals available in stores. However, there was no statistically significant difference between Home Cookers who are employed full time, and those who are not employed, or between high and low income Home Cookers with regard to their attitude about ease of preparation. This is a significantly large group whose preferences should not be ignored in the drive to provide consumers with what they want when they want it. This group was also more comfortable with food labels than other groups. One might infer that they also use food labels more.

Members of the Office A cluster were more likely to look for nutrition information when buying frozen dinners than the rest of the sample. This group also was more likely to be employed full time and thus may have relied more heavily on ready-to-heat meals than the rest of the sample. People in the Fast Food B cluster were more likely to believe their diet was just about right in cholesterol, Yet, as shown in Table 8, this group also consumed more eggs, meat, and high cholesterol foods. Whether this paradox results from people with naturally low cholesterol levels eating more high cholesterol foods or self delusion cannot be determined.

## **Food Mix in Each Cluster**

Finally, this study aggregated food consumed into nine categories: grains, vegetables, fruit, milk (liquid), meat, eggs, legumes, nuts, and discretionary fat (e.g. butter, salad oil) and examined the average proportion of the diets of those in each cluster that each food group comprised. Table 8 shows the percentage that each food category comprised in the total diet for

each cluster and the overall average ( the rows sum to 100 percent). Since the store cluster was so large, it dominated the overall average. For example, 14.9 percent of the Home Cookers diets were made up of food from the fruit category, while the overall average was 14.1 percent and the average proportion of the diets of all groups without the Home Cookers included was 13.0 percent. Looking at the bottom two lines of Table 8 shows that Home Cookers ate more grains, fruits, and milk than the average of all other clusters combined. They ate fewer vegetables and eggs and less fat and meat. Home Cookers ate about the same amount of legumes, nuts, and seeds. Contrary to the stereotype, Fast Food A ate less fat than the average, while the High Service, Muchers, Office B and C, Common Coffee Pot A and B, and Catalog groups all ate more fat than average, as a portion of their diets. Not surprisingly, the Fast Food clusters and High Service groups ate more meat, and less fruit than the average. Those who ate in other people homes (Muchers), and members of the Quarter Spenders (vending), and Office B and C clusters ate a higher proportion of meat. Muchers, Office C and Students ate more fruits. The Fast Food A and C, Students, and Office A clusters under consumed vegetables, while Common Pot B, Pubs, and Public clusters consumed vegetables in larger portions. Keep in mind that some of these clusters are a small part of the total sample, but some niches are suggested. Members of the Fast Food A and C, Students and Faculty, Common Pot A and B, and Catalog Shoppers consumed larger proportions of fluid milk.

**Table 8: The Percent of Diet Each Food Group Occupies in Each Cluster**

Cluster	Grain	Vegetable	Fruit	Milk	Meat	Egg	Legume	Nut/seed	Fat
Home Cookers	25.0	18.0	14.9	19.8	17.2	1.5	2.0	0.3	1.3
Fast Food A	26.7	16.1	11.8	18.8	20.9	2.1	2.0	0.2	1.3
Fast Food B	24.6	18.0	9.1	12.6	28.1	3.3	2.6	0.3	1.3
Fast Food C	24.7	16.4	6.8	19.1	28.2	1.9	1.6	0.2	1.1
High Service	25.4	19.8	12.0	15.5	20.7	2.5	2.2	0.3	1.7
Muchers	25.9	18.8	15.4	15.8	19.3	1.5	1.4	0.3	1.5
Gardners A	20.6	23.5	15.8	18.8	15.9	2.0	2.2	0.3	1.0
Gardners B	16.9	29.9	12.8	18.9	15.2	1.3	3.6	0.2	1.4
Quarter Spenders	26.6	16.9	11.1	18.0	22.0	1.9	2.0	0.4	1.2
Office A	25.2	16.6	15.5	19.4	17.3	2.0	2.1	0.5	1.4
Office B	23.2	19.8	13.7	17.7	19.6	1.4	2.7	0.4	1.6
Office C	22.5	19.5	15.5	16.3	20.1	1.7	1.6	0.5	2.3
Students	23.6	15.9	17.7	25.2	13.8	0.9	1.1	0.3	1.4
Common Coffee Pot A	22.9	18.6	13.7	20.0	19.5	1.6	1.3	0.8	1.6
Common Coffee Pot B	21.4	19.4	12.2	20.9	20.8	2.1	0.5	0.8	1.8
Pubs	22.0	19.8	12.5	18.3	21.0	2.2	1.7	0.8	1.7
Public A	37.2	19.2	12.7	11.7	17.1	0.8	0.3	0.1	0.9
Public B	29.0	18.1	16.4	16.0	16.0	2.0	1.5	0.2	0.8
Catalog	28.0	18.9	14.0	20.4	13.4	0.8	2.0	0.3	2.2
Overall Mean	24.9	18.4	14.1	18.6	18.5	1.8	2.0	0.3	1.4
Mean, No Home Cookers	24.8	18.8	13.0	17.4	20.1	2.0	2.0	0.3	1.4

## Conclusion

This study examined what American individuals reported having eaten and where they obtained their food in 1994. The results provide an alternative picture of food consumption relative to food expenditures and sales. While it is true that Americans obtained food from many retail and home-grown sources, they still obtained 72 percent of the grams of food consumed at a retail food store. Shopping patterns varied by age, income, and household composition. Teenagers and young adults tended to consume more food from sources other than stores, while older adults and households with children consumed more food from stores. Children and households with children were also more likely to consume three meals a day. Children and teenagers ate more snacks than older people, as did higher income people.

The adult population was grouped into clusters based on the percent of the volume of food that each individual obtained from each source. By far the largest group, comprising nearly half the data set, was the Home Cookers. This group obtained an average of 93 percent of their food from stores. While members of this group were more likely to have a lower household income than other adults in the sample, all income levels were represented in this cluster. This cluster purchased 59 percent of all the grams of food that were sold in stores, 20 percent of restaurant food, and 13 percent of the food from fast food and pizza establishments. This group was also more interested in food labels and less interested in how difficult a meal is to prepare. Combined, the Fast Food clusters (14.7 percent of the sample) were younger than the rest of the sample, and were more likely to be employed full time, and were better educated. These groups consumed 61 percent of the grams of food sold in fast food and pizza establishments, but consumed a much smaller share of the food from other sources. The next largest group was the



High Service group, which was just under 10 percent of the sample. This group obtained a much larger percent of their food from restaurants than other groups and tended to have higher incomes, more education, and were more likely to be employed full time. This group bought 6 percent of the store food actually consumed, 50 percent of restaurant food, 7 percent of food from fast food and pizza establishments, and 2 percent of food from cafeterias. Similarly, the Office and Student and Faculty clusters ate a large share of the cafeteria food (82.5 percent), but a smaller fraction from other sources. The Student and Faculty cluster had nearly as high a rate of high school graduates (90.6 percent) as Fast Food C (91.3 percent) which had the highest rate. Fast Food C also had the highest employment rate (95.7 percent), followed by Office C (91.3 percent).

This research set out to learn where people obtained the food they reported eating and to determine whether there were significant differences in the characteristics of people who obtained significant portions of their food from places other than a retail food store. An extension of this study is to repeat this analysis on data ten and twenty years older in order to find patterns of food consumption behavior in terms of how much of what types of food is being purchased from which retail sources and by whom. We already know that in 1977, 82 percent (10 percentage points more than in 1994) of food eaten came from a retail food store and that fast food establishments account for most of the change in the meantime. With the rapid evolution of the retail food market and consumers' lifestyles, these changes are accelerating. Identifying the change leaders and their preferences will help retailers and those who design public food policy better serve consumers.

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