A Day Without FAFH Is A Day With Better Nutrition

by

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An important change in the American diet in recent decades is the increasing reliance on foods consumed away from home (FAFH). Between 1970 and 1997, spending on FAFH rose from 26 to 39 percent of total food expenditures; during the period the proportion of total calories accounted for by table service and fast food restaurants rose from 6 to 20 percent (Lin and Frazao,1999). Since foods at home and away from home tend to differ, the consequences of this trend for nutrition is a question of considerable interest, especially given the current emphasis on how diet affects health.

Generally, it has been found that foods eaten in restaurants[1] contain relatively large quantities of nutrients overconsumed and relatively low amounts of those underconsumed. A special concern is dietary fat, for studies show that FAFH tends to be calorie dense. (1) Much has been made of the phenomenon of "supersizing" by restaurants and fast food outlets, which provides larger portions for a disproportionally small price increase. In the limit we have "all you can eat" deals, which are the stock in trade of buffet style restaurants, by which once the fixed meal charge is paid, marginal cost is zero, and the "rational" consumer will eat until marginal utility is also zero, certainly more than when there is a charge for additional helpings. As shown below, such pricing tends to encourage overeating more for FAFH relative to home meals. However, a recent study has shown that portions of popular foods, especially of the kind available at fast food outlets, have been increasing (Samara and Popkin, 2003), even when prepared at home. Perhaps consumers have learned to expect large portions, irrespective of where they eat.

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[1]In this paper the term "restaurant" includes both table service restaurants and fast food outlets.

Obesity is rapidly becoming the nation's major health problem. In the period from 1976-1980 to 2000, the prevalence of obesity among US adults rose from fifteen to almost 31 percent; for children from 7.2 to 11.6 percent. The distribution of BMI[2] for most population subgroups has shifted to the right, with a tendency to becoming more upward skewed (3,5). That this has paralled rising FAFH consumption has implicated the restaurant industry–especially fast food–in the obesity epidemic.

In general, the growth in FAFH's share of US food consumption, the fact that foods eaten at restaurants may significantly differ from those consumed at home, and the increasing evidence of the role of diet in health, all combine to make this shift in eating pattern a matter of potential policy importance. As Lin, Guthrie, and Frazao note,

> The social, demographic, and economic factors that promote dining out should continue to boost away-from-home food spending. Consequently, it is important to understand the trends in the nutritional profiles of food at home and away from home and how the trend toward dining out might affect diet quality. (1999, p. 2)[3]

Studying this linkage has proved difficult. One problem is separating possible effects of increasingly sedentary lifestyles. Another is the proper measurement of dietary intake. For example, the fact that restaurant meals are energy dense is not conclusive evidence they degrade the total diet, for individuals may well make counterbalancing adjustments in other aspects of the

[2]BMI is the Body Mass Index, which is the standard measure of weight status. It is defined as the weight in kilograms divided by the square of height in meters.

[3]Away-From-Home Foods Increasingly Important to Quality of American Diet, USDA, ERS Agriculture Information Bulletin Number 749, January 1999.

daily diet[4]. Measuring just one or two days of food intakes and then relating FAFH consumption to obesity differences leads to measurement error, because despite the growth in FAFH, most people do not dine on restaurant or fast food on any given day. Studies using this measure (eg Binkley, Eales, and Jekanowski, 2000) at best can only identify weak effects. One study (McCrory et al., 1999) found a significant correlation between overweight and fast food visits in a survey of individuals, but this is only suggestive since causality direction is not identified. If, for example, restaurant and fast food fare is energy-dense, then people with a preference for such foods, and who already have poor diets, will be especially attracted to eating out. Then blaming FAFH for poor diets will be to a large extent specious.

A final difficulty is that survey data usually involves self-reports of food intake. Self reported data has been found to understate actual food intake, with a greater tendency for overweight individuals to do so (Variyam 2002).

In this study I attempt to avoid these problems in a simple manner, using a simple premise. If FAFH is reducing the quality of the American diet–in particular, if it increases consumption of calories, then, for a given consumer, the nutritional content during a ‘typical’ day with a restaurant meal should be worse than a day without one. Using a day rather than a meal as the unit of observation allows for non-FAFH dietary adjustments; observing the same individual controls for confounding factors like physical activity.

The results of the study show that increasing consumption of FAFH is most likely reducing the quality of the American diet. In particular, days with a restaurant meal tend to

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[4]In a study in which subjects ate a calorie-reduced diet on one day, it was found that they compensated on the next (Goldberg et al., 1998)

feature significantly more calories and fat, and significantly less fiber and vitamins. Calcium intake tends to be lower as well. Although consumers (consciously or unconsciously) appear to compensate for the lower nutrition of restaurant meals by adjusting their diet during the rest of the day, the adjustment is incomplete. They are not substituting one kind of poor nutrition for another.

Economic Issues

Price

An individual's diet reflects individual choice, choice constrained by income, product knowledge, and the environment in which choices are made. Hence nutrition is an economic issue as well as a biological one. An important case is that of the oft-noted super-sizing phenomenon, which is an example of nonlinear pricing, in which the price paid for a good does not expand proportionally with the quantity consumed.

I consider an extreme case, one which is quite common in the restaurant industry and in the context of obesity may be more important than super-sizing. In figure 1 is depicted the demand curve of the average consumer for the food of a typical restaurant. The downward slope reflects the monopoly power that most restaurants have due to location, advertising, and product differentiation. For convenience, assume the marginal cost per unit is zero. (This is equivalent to assuming constant costs, which it probably is for most restaurants.) Under the conditions depicted, a profit-maximizing restaurant would charge price ad, at which return above variable cost is adfe. If adfe exceeds fixed costs, the restaurant can profitably operate. The consumer has surplus of bdf.

The above is the optimum under linear pricing: the patron pays ad for each unit consumed. But the restaurant can do better. Rather than selling food in divisible units, the buyer can be required to purchase ae units. Rather than do without completely, the buyer would be willing to pay as much as abfe for this quantity, more than the adfe paid under linear pricing. The best option for the restaurant is the "all you can eat" strategy: charge the patron abc for the privilege of unlimited eating, thus extracting all of the diner's consumer surplus. What is important in the present context is that consumption increases from ae to ac, at which the marginal utility of food is zero. The nonlinear price forces economic man either to consume nothing or to be a glutton. A key aspect of the case is that once the fixed entrance fee is paid, the consumer is in a "use it or lose it" situation. Unlike home consumption (where the marginal food cost is obviously not zero), there is no leftovers option.

In practice finding the best all-or-nothing price is not so simple, because consumers have differing demands. Consumers with a smaller demand than that depicted, and hence with a willingness to pay less than abc, will go elsewhere: those with greater demands could be made to pay more. Ideally, of course, the restaurant would like to charge those with differing demands different prices; however, the difficulty of keeping the submarkets separate generally precludes such a strategy.[5] The optimum involves a tradeoff between completely losing those with limited demand and failing to extract all the surplus from consumers with high demand. It is complicated by the fact that, in reality, the marginal cost of food to the restaurant is non-zero, so failing to charge a sufficiently high price to those with very high demands may not cover the food

[5]Coupons provide one method of market separation. It is no accident that food outlets are one of the major users of coupons. Another is senior citizen discounts. This is especially appropriate for restaurants, because older individuals tend to eat less and thus have lower demands for FAFH, especially buffet-style.

costs of their meal.

The last point has an important implication in the present context: big eaters will find restaurants with all-or-nothing pricing especially attractive, because the cost to them of overindulgence is lower than any alternative, including home consumption (especially given preparation costs). In effect they are subsidized, and as a consequence they will tend to eat more than they normally would.

It also seems reasonable to expect that lower income individuals will be attracted by all-you-can-eat pricing. Because food comprises a larger portion of budgets in low income households, low income consumers should be more sensitive to food prices, because income effects from price changes can be large. Furthermore, the lower the income, the more important is quantity and less important quality (e.g., in terms of sensory aspects). All-you-can-eat establishments obviously feature quantity over quality, so it is reasonable that the customer base of these restaurants will have a disproportionately large number of low income consumers. If buffet style encourages overeating, it would follow that low income persons are especially affected.

As noted previously, most of the criticism of restaurant pricing revolves around the "supersizing" practiced by fast food outlets, in which increasing the size of items like soft drinks and french fries leads to a disproportionately small increase in price. This is conceptually similar to the above. The only difference is that it is item-specific, and consumers now *can* be charged more in accordance with their individual demands, simply because the extent of demand is revealed by the choice of size. But it should have similar effects in terms of encouraging some overconsumption. Nevertheless, an important difference between fast food restaurants and their table service counterparts is that the former makes more use of a la carte pricing—usually, if you want to eat more, you must pay more. Even when dining at a traditional restaurant, an individual will tend to overeat as long the food on the table exceeds what would be chosen at positive marginal cost.[6] If nothing else, one can eat all the bread provided, and usually get more at no charge.[7]

Product Information

In recent decades research has demonstrated the existence of strong linkages between diet and the incidence of several major long term diseases, including heart disease and most cancers. As a result, the US Government has adopted a strong stance of promoting healthy diets and increasing the nutritional literacy of Americans. The centerpieces of this effort are the Dietary Guidelines for Americans and the Food Guide Pyramid. Also, most packaged foods are now required to carry nutrition information. Meanwhile, nutrition and health claims have become important marketing tools for major food companies, and many products have been developed to serve particular nutritional purposes.

Studies by agricultural economists have shown that such efforts have affected the demand for several important food commodities.[8] Strong impacts have been identified, suggesting that

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[6] I am implicitly contrasting this with eating at home, where leftovers are easily stored in the refrigerator and hence do not have zero opportunity cost.

[7] If the meal has skimpy portions, then the individual may undereat. But given that the marginal cost of food to the restaurant is low, and that skimpy portions do not encourage repeat business, restaurant portions are more likely to be excessive. The recent growth in restaurant portions may be a result of an increasingly competitive restaurant environment.

[8] See J Variyam and E Golan, “New Health Information Is Reshaping Food Choices.” *Food Review*, Spring 2002, pp13-18 for a good review of these studies.

nutrition information has reduced the demand for fattier foods and foods high in cholesterol.[9] However, as suggested above, the impact on FAFH appears to be much weaker than that on at home eating. A reasonable hypothesis to explain the difference is that nutritional information in the former case is lower. For foods prepared in the home, the consumer knows (or can easily determine) the components, the amount of salt, fat, and so on. For convenience items such as frozen dinners, detailed nutrition information is printed on the package. These are less true of foods eaten in restaurants. It is more difficult to determine ingredients or preparation methods, and few establishments provide the explicit nutritional content of their meals. So product knowledge for FAFH for most consumers will be lower than when eating at home. Variyam and Golan note one study in which trained dieticians substantially underestimated the fat and calorie content of five restaurant meals.

In short, the economic environment for away from home food consumption differs from that at home, both with respect to price and product knowledge. A goal of this study is to see whether the evident lower nutritional quality of restaurant and fast food meals does degrade overall nutritional intakes, and whether any differences in the nature of home and away from home eating appear to be caused by these economic factors.

Data

I use a subset of the 1994-96 USDA Continuing Survey of Individual Food Intake. This is a survey of detailed dietary intakes for two nonconsecutive days for16103 individuals (in a few cases only one day was taken). From these I selected all who had exactly one complete

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[9]That fat consumption has declined while obesity has increased is one of the puzzles of the obesity problem.

FAFH occasion (table service or fast food) on one day and none on the other, and who reported that for neither day was the amount more or less than usual. An “occasion” is breakfast, brunch, lunch, dinner, or a “break or snack.” This yielded 1212 observations for the study.[10]

In many contexts, a sample size of 1212 is very large. For survey data on individuals, however, it is quite modest, because data at the individual level is usually very noisy. This is especially true for food intake, because what people eat tends to vary considerably from one day to the next. This variability is illustrated by the low R^2 that is usually obtained when performing regression analysis with such data.[11] For this reason , the analysis here is confined to simple comparisons of nutritional intakes of days with a FAFH occasion and days without. Most of these involve subgroups of the sample, reducing sample size further. Differences in intakes of major nutrients and food-group servings on the two days are computed and tested for significance. However, I do not emphasize formal hypothesis tests.

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[10] One issue that might seem important is that people tend to go to restaurants more on weekends, and on weekends they also may tend to eat more. Ignoring this could blame FAFH for the ill effects of weekend diets. In the sample, I found that people do tend to consume more calories on weekends, and a greater proportion of FAFH occasions occur on weekends. (About one third of the FAFH meals were on weekends, compared to 25 percent for those at home). However, the difference between weekend and weekday consumption at home is greater than that difference for FAFH, canceling the effect of more occasions of FAFH on weekends. Thus, the weekend effect is ignored.

[11]For example, Nayga and Capps (1994) used data from the 1987-88 Continuing Food Survey to examine fat intake at home and away from home. Their best R^2 was less than .05, using 23 variables with over 6000 observations. Wilde, MacNamara, and Ranney (1999) did better in their study using the 1994-96 data (as high as .21), but their dependent variables were numbers of servings by food groups, such as fruits.

Results

The analysis is based on data of the form $z_i = (y_{ija} - y_{ijh})$, where y_{ija} is individual j's intake of nutrient i on the day that included a restaurant meal, and y_{ijh} is the corresponding value for the day with no such meal. In this paper I will confine attention to major nutrients: total grams of food, calories, fiber, calcium, saturated fat and total fat, sodium, and vitamins A and C.

In table 1 I present the average results for the entire sample. The first column has the averages values of the z's. The t statistics and associated prob values are for a test that z=0: there is no difference in intake of the nutrient across the two days. The column labeled "Percent Change" is actually z divided by the average intake of the nutrient involved over all observations.[12] The last column has the percent of the sample that increased their intake of the corresponding nutrient.

According to these results, the average person consumed 87 more calories on the FAFH day than on the 'at-home' day, or approximately 5 percent more. As measured by the t test, this difference is highly significant. Although the total weight of food increased, the 33 gram (slightly more than an ounce) rise is small, and lacking in statistical importance. The primary reason for the calorie increase is obviously the fat density of the foods eaten on the FAFH day, for average fat intake was much higher on that day. Along with this we have significant reductions in average intakes of vitamins C and A and in fiber. Generally, there is a suggestion of substituting fat and animal-based products for fruits and vegetables on days with restaurant food.

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[12] I use this rather than the average of the percent change for each of the 1212 individuals because the latter can be very sensitive to individual observations, since the measure is a ratio.

In most cases the median of the differences is substantially closer to zero than is the mean difference. The distributions of the differences are skewed. Indeed, tests of normality are in most cases rejected, which is a good reason to view the t statistics as only indicative. What is perhaps most interesting is the last column, showing the percent of the sample who increased intake of each nutrient. In particular, although on average caloric intake rose significantly, 46 percent of the sample ate *fewer* calories on the FAFH day, and only a little more than half of the individuals ate more food in total. The largest differences from 50 percent involve fats and vitamins.[13] The evidence here is that reduction in dietary quality due to FAFH may affect only particular groups/individuals, an issue examined further below.

The differences in table 1 measure the net effect of FAFH, that is, after accounting for any adjustments during the rest of the day. An important question is the extent to which they are the direct effect of FAFH, before any compensation occurs during the rest of the day. To address this table 2 shows the direct effects, the same measures as in table 1 but confined to the meal involving FAFH. Thus, if a particular respondent's FAFH day involved lunch at a fast food restaurant, the difference is the nutrients therefrom less the nutrients at lunch on the day with no fast food. This involves losing about 200 observations, for in some cases the meal eaten at a restaurant was skipped on the non-FAFH day. Also, snacks and breaks can occur more than once during a day, and these were not included. This accounts for the differences between corresponding measures in the two tables.[14]

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[13]If the true proportion is .5, with 1212 observations the sample proportion will fall between .47 and .53 about 95 percent of the time.

[14]That the calorie difference in table 2 is smaller than the intake in table 1 implies the difference for the full day is larger when the meal eaten out on the away day is skipped on the

Not surprisingly, the direct effects of the FAFH meal are measurably larger than the net impacts for the entire day on which it occurred: diners do make compensating adjustments in their diet during the rest of the day, at least in terms of total food grams, fat, and calories. For these the average diner reduces the excesses directly associated with the FAFH meal by about one third. However, the remainder is not trivial.

Compensating for a FAFH meal during other eating occasions of the FAFH day would seem more likely the earlier in the day the FAFH meal occurred. To investigate this, and generally to compare differences across meals, I present in table 3 the same information as in table 2, but specific to breakfast, lunch , and dinner. From these it is apparent that in each meal the FAFH meal is worse, both quantitatively and statistically, for virtually every nutrient. This is especially true with fat and calories. However, it does not seem that the amount of "rest of day" compensation declines in going from breakfast to dinner. The latter appears to involve nearly as much calorie adjustment, and certainly no smaller amount of food. Generally it appears that a FAFH breakfast poses the biggest challenge to nutrition, as home and away from home breakfasts differ substantially. However, the low sample size and consequent limited significance preclude any firm conclusions. This is true throughout the table. Significance is much lower in the case of the individual meals than in the case of all meals in table 2.

I now consider some important subset comparisons, beginning with restaurant types. Table 4 has results divided into those for table service and fast food. In popular discussions of obesity and FAFH, it is usually fast food that takes the brunt of the criticism. However, the results in the table suggest that a table service meal is more detrimental to the average per-day

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home day.

nutrition profile. In the sample this is especially true of fat intake, which in the case of table service rises by over ten percent. The difference matches the result of Li and Frazao, who used all observations in this data set and found that table service food is more energy dense than fast food.

Nutrition is especially important during growth, making childhood nutrition--certainly including the role of FAFH--a matter of special concern. Thus, an important question is whether there are differences in how FAFH affects the nutrition of children vis-a-vis adults. In table 5 are presented the FAFH-induced nutrition differences separately for children and adults. (I classified anyone over 18 as an adult.) Comparing these groups shows that the adverse effect of FAFH on the day's nutrition is somewhat worse for children, primarily due to a greater increase calories.[15] In the sample this seems to be more due to increasing food intake than to more fat. However, both play a role. The other important difference is a larger decline in calcium for children, most likely due to substituting soft drinks for milk.t   The difference is moderately significant. In view of the importance of calcium at this time of life, this may be the most damaging effect of FAFH for young people.

In tables 6 and 7 the results are segmented by gender as well as age. Most research on nutritional intakes and health status has found significant gender differences, generating an expectation that males and females may respond differently to an 'injection' of FAFH. This is found to be the case, certainly for adults (table 6). The average increase in fat–and thus calories–is much smaller for women, while the decline in the two vitamins is larger. Although

[15]Contrary to conventional expectations, when children ate fast food there was less damage to nutrition than when they ate at a table service restaurant.

calcium has no significant effect for either gender, women, for whom calcium is especially important, reduce average intake while that for men increases. Gender differences in children are much smaller, too small to be meaningful, for the sample sizes are not large enough to support a high degree of confidence.

Previous studies of nutrition status have often found differences between minority groups and the rest of the population, especially with respect to obesity (Strauss and Pollack; Flegal, Kuczmarski and Johnson). Generally it has been found that obesity is more prevalent among African Americans and Hispanics than among other races. This suggests different dietary behavior which may be associated with FAFH. To examine this I compared the intake differences for minorities (African-Americans and Hispanics) with the rest of the population. Results appear in table 8. Although both groups increased fat intake by the same amount, for minorities the increase in calories was twice as large. The relative difference in total grams was even greater. However, this is evidently due to a small number of individuals, for grams is extremely skewed, with a median far below the mean (and considerably below the majority group median). The large calorie difference coupled with the absence of a difference for total fat suggests a larger difference for carbohydrates, which I verified with further investigation.[16]
In general, then, the results in table 8 are what be expected if minorities are more prone to obesity problems, as previous research has found.

I now consider the potential effects of restaurant pricing. Above it was shown how the nonlinear pricing used by fast food and table service restaurants can encourage over-eating,

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[16]Separate analysis on each minority group led to broadly similar results, with Hispanics showing larger differences.

essentially by disturbing the marginal conditions that would be met with a constant price per (small) unit. Nonlinear pricing, being a form of price discrimination, favors those with price elastic demands. In this case, we expect that group to include lower income consumers and overweight consumers (on the assumption that overeating is a major cause of overweight). Hence if price is important, it is reasonable to expect that those with lower incomes and those with higher BMI's would have larger increases in food consumption on a day with FAFH.

In table 9 are presented results for adults, split at the median per capita household income.[17] Only differences in total food grams and calories are shown, and they are shown for the entire day and for the specific meal which was eaten at a restaurant, presented by restaurant type. Results for the entire day show only marginal differences between the income groups. Although the low income half does have a larger increase in grams, it is small, and neither of the individual increases is significant.

The important measure for considering a price effect are the differences for the specific occasion on which FAFH was consumed. In the case of fast food, not only does the lower income group have a smaller increase in food grams than does the high income group, the 'increase' is actually negative! For neither group, however, is there any significance, and there is no difference in calories. Results for the table service group are quite different. Both grams and calories are significant for both groups, and in each case larger for the lower income consumers. The average difference in total intake is nearly two ounces.

[17] Children and teens are not included because they are less alert to the role of income and prices.

If, as hypothesized, lower income FAFH consumers are more price responsive[18], then table 8 provides no evidence that "supersizing" at fast food outlets is an important reason for overconsumption. Conversely, there is evidence that pricing at non-fastfood restaurants–possibly including those with a focus on buffet eating–does increase consumption. This suggests that the culpability placed on fast food pricing may well be misplaced. At a minimum it is undoubtedly exaggerated. At the typical hamburger franchise, the only individual items with substantial quantity discounts are french fries, and especially drinks. Most food is sold a la carte, the exception being "value meals," which usually bundle smaller sizes of individual items. In short, table 8 is more evidence that in the debate over overeating and FAFH, focus should perhaps be turned to non-fast food restaurants.[19]

Corresponding results for adults separated by weight class appear in table 10. I defined the weight class using age-sex normalized BMI's ("z-scores"). For both types of FAFH, heavier individuals have a greater increase in food for the meal taken at a restaurant versus taken at home, possibly suggesting a more price elastic response. This time, however, the table service difference is inconsequential; that for fast food is much larger, with the value for the leaner consumers actually negative. Generally, then, the support for a price effect is rather anemic.[20]

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[18]From the sample sizes we see that a much larger percentage of the low income sample chose fast food than did the high income group. This suggests a greater concern with price.

[19]Not shown in the table is the net effect (for the entire day) for each FAFH type. For the high income group, the net calorie increase on a table service day is 73; for fast food it is 48. The corresponding values for low income diners are 138 and 21. So again, table service is worse, especially for lower income consumers.

[20]I inspected the specific foods chosen by the two groups at fast food outlets. The biggest difference between them was that the average size of soft drinks selected by the lean group was about 16 ounces; that for the heavier group was about 20 ounces. Soft drinks are the item sold

What is most interesting about table 10 is the evidence that leaner people compensate more for the nutritional excesses of FAFH during the rest of the day. In this sample those with the lower BMI's overcompensate. While not shown here, we also found the "normal" (i.e. non-FAFH) diet of those with positive BMI z-scores to have an average calorie density just as large as that when eating out. The diet of the lean group was less energy dense when not eating at restaurants. Because the latter group does not have an obesity problem, the data suggest that to the extent that FAFH is contributing to the obesity problem, it is because it encourages over-eating and not because of its high energy content. The diet of individuals in this sample who are potentially obese is equally energy-dense at home and away.

I now consider the role of nutrition knowledge. Because more highly educated individuals have superior information processing skills, it is generally agreed that they have more nutrition knowledge, making them more likely to follow good dietary practices. Most studies have found a positive relation between education and nutrition. Thus, a natural way to examine the daily nutrient differences is by education. In table 11 are presented results split by whether individuals had some college education.[21] For children and teens the measure pertained to the average education level of the household members identified as "head." For both adults and young people in the sample, those with higher levels of education display smaller increases in both calories and total food intake. Although the majority of the measures have t-values under 2, the differences between the lower education-higher education groups appear to be "nutritionally

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with the steepest quantity discount, so this supports a price effect.

[21]The education variable in the CSFII data is years of schooling completed. A value of 13 or more was considered as having some college.

significant," especially for adults.

In truth, however, these measures hide some interesting gender differences. Results above show large differences in behavior between men and women, as well as between income groups, and now by level of education. I repeated the analysis by income and education, doing this on each gender separately, obtaining the results in table 12. As can be seen, the gender effect differs by income and level of education. Although the low levels of statistical significance preclude any pretension of conclusiveness, it is evident that, to the extent that gender differences exist, they are more important at low levels of income, and certainly at higher levels of education. It is clear from table 12 that the adult education effect in table 11 is entirely due to women.[22]

These results may be related to those of Variyam et al. They found that the favorable effect of higher income and higher education on the nutritional quality of diet is mostly due to the fact that higher income individuals have more access to nutrition information, and those with higher education–especially women-- can make better use of it. However, in the case of college men, the table shows a rather large calorie increase, but only a modest increase in grams, suggesting that when eating out, they select meals with lower nutrition rather than overeat.

In addition to the intake data, the CSFII data base includes a diet and health knowledge survey (DHKS), administered to a subset (5765) of the 16103 individuals. 431 of these were in the sample used here, and these were examined to gain further insight into the role of dietary knowledge. The limited sample precludes anything elaborate, so attention is confined to gram

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[22]The results for education and income in table 12 might seem inconsistent, since we usually high correlation between these variables. However, the correlation between education and income in the sample is only .4.

and calorie differences and how they relate to the responses to selected questions. The selected questions and the daily differences are presented in table 13. Levels of significance are low, so these are descriptive.

That said, we note from the first two questions that individuals who do not believe they have a weight problem appear to be more likely to eat more than usual on FAFH days and to get more calories. Perhaps one reason for over-indulgence when dining away from home is insufficient self awareness. Question 3 suggests that those who rate nutrition important when shopping do a better job of selecting foods when dining out. As compared to the ‘no’ group they tended to have a large increase in total intake, but their calorie increase was considerably smaller. This could be accounted for by more salads, with a high weight to calorie ratio. A similar effect is seen with question 4. Although those claiming high use of nutrition labels on processed foods (a minority of the sample) had a greater increase in calorie consumption than non-users, the increase in total food was proportionally much greater. If they are overeating in restaurants, they are at least selecting foods with a lower calorie density. Comparing those claiming to fully understand labels (a smaller number than those claiming frequent use!) to those who not, we find a very large difference. Those with less confidence resemble the full sample: the confident users appear to actually reduce eating on days with FAFH. Whether this is meaningful is not clear (especially given significance levels here). But it does suggest the possibility of a positive effect from well-understood nutrition information.

Concluding Remarks

Previous research has shown than when dining away from home consumers tend to have less healthy diets, for the foods available and chosen by restaurant diners tend to be relatively low in more healthy nutrients while being high in less desirable ones. In particular, it has been found that many restaurant foods are high in fat and calories. In this study I investigated this question, but I focused not just on the FAFH meal but on the entire day on which it was eaten. A sample of 1212 individuals was used to compare the nutritional intakes on two days, days differing only in that one included a single restaurant meal. Thus, the study is a quasi-experiment: the only variable is FAFH. The results of the study broadly confirm what has been found using other methods. On average, the sample individuals consumed more fat and calories and less vitamins and fiber when dining out. What is important is that I found this to be true for the entire day, not just for the FAFH meal. Although there is a tendency for nutritional compensation at other parts of the day–by, for example, consuming less fat during the rest of the day–it appears to be partial at best. Net differences remain. The net calorie difference is 87, suggesting that restaurant dining may be an important factor in the nation’s obesity problem. Surprisingly, the extent of the adjustment in the sample displayed little relation to the when the FAFH meal occurred.

However, in this case averages can be deceiving, at least with respect to calories. Although the mean increase in the sample is 87 calories, the median increase is 56 calories, very much less. Furthermore, nearly 45 percent of the sample consumed *fewer* calories on the day with FAFH. In other words, the distribution of this variable is skewed, and the large average increase may be due to a small number of individuals. Interestingly enough, the distribution of BMI is becoming more skewed as well, with the mean increasing faster than the median (Cutler et al 2003).

Additional results from the samplesuggest population groups more likely to contain these individuals. Those under 19 were more likely to have a higher calorie, less nutritious diet on a

FAFH day, as were males of all ages, with the difference especially pronounced among adults. Indeed, adult women's FAFH diet seems to not greatly differ from home consumption. No striking differences between racial groups were evident in the sample. This was also the case for income groups.

Those who themselves have education beyond high school, or children with parents having some college, had smaller increases in food grams and calories on the FAFH day. It is well known that nutrition knowledge increases with education, so it is reasonable to infer that the difference is due to greater vigilance when eating away from home. However, the worst performance was turned in by college men, in sharp contrast to educated women, who actually reduced their calorie on the FAFH day. While previous studies have found women to be more nutritionally aware than men, this sample difference was striking. A portion of the sample was asked a series of questions concerning nutrition knowledge, and these permitted a direct assessment of the role of knowledge. This further suggested that higher knowledge leads to a better FAFH diet, although the limited sample precludes firm conclusions. Overall, the study is supportive of a view that nutritional labeling of restaurant meals is needed.

One consistent pattern that appeared in the results is that for nearly every important population group–including children–fast food was less destructive to diet than was food from a table service restaurant. Also, my consideration of the possibility that FAFH pricing encourages overeating show that any such effect is more likely to be present at table service restaurants 9although no strong effect was revealed). Thus, the tendency to heap all the blame on the fast food industry appears to be facile, and somewhat unfair.

In closing I simply repeat that this study is exploratory and descriptive. Simple means have been used, for, despite the semi-experimental nature of the case, the data remains very noisy. Intake of nutrients on a given day, and hence differences between two days, are subject to a host of contingencies. That said, the results certainly support the oft-made contention that increasing reliance on meals prepared outside the home is reducing dietary quality, particularly as it affects obesity. It is difficult to dismiss the fact that, in the sample of 1212 individuals used here, a 2 standard error confidence interval for the extra calories on a day with FAFH is from 44 to130. Taken at face value, this implies a typical individual with two restaurant/fast food meals a week would gain more than two pounds a year, certainly suggesting a role for FAFH in the obesity epidemic.

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Table 1. Nutrient Difference, FAFH Day vs. Day Without FAFH, Entire Sample

Nutrient	Mean Difference	t-stat	Percent Change	Median Difference	Percent Increasing
Amount of food in grams	33.66	1.49	1.79	20.81	51.65
Food energy - kcal	87.24	4	4.84	56.23	53.88
Dietary fiber	-0.8	-3.02	-5.55	-0.43	47.28
Calcium - mg	-11.99	-0.85	-1.55	4.38	50.5
Saturated fat - g	1.79	4.3	7.8	1.71	56.35
Total fat - g	5.78	5.05	8.67	5.59	57.84
Sodium - mg	28.97	0.6	0.95	25.66	50.99
Vitamin A - RE	-93.17	-2.19	-9.95	-73.39	43.56
Vitamin C - mg	-8.13	-3.19	-8.61	-4.84	45.38

Table 2. Nutrition Differences, Entire Day and FAFH Meal

Nutrient	Entire Day	t-stat	FAFH Meal	t-stat
ALL MEALS n=1011				
Amount of food in grams	31.93	1.3	46.81	3.73
Food energy - kcal	74.05	3.14	111.54	7.64
Dietary fiber	-0.85	-2.94	-0.6	-3.35
Calcium - mg	-25.79	-1.67	-19.25	-2.3
Saturated fat - g	1.31	2.9	1.8	6.43
Total fat - g	4.69	3.82	7.19	8.68
Sodium - mg	-11.95	-0.23	83.54	2.5
Vitamin A - RE	-40.29	-0.88	-76.5	-4.07
Vitamin C - mg	-8.74	-3.18	-7.06	-5.06

Table 3. Nutrient Differences, Entire Day and FAFH Meal, by Meal.

Nutrient	ENTIRE DAY	t-stat	FAFH Meal	t-stat
	BREAKFAST n=63			
Amount of food in grams	56.631	0.56	45.34	0.9
Food energy - kcal	101.78	0.9	150.79	3.75
Dietary fiber	-1.774	-1.26	-0.45	-0.98
Calcium - mg	-24.51	-0.49	-24.9	-1
Saturated fat - g	4.853	2.69	4.83	5.22
Total fat - g	9.851	1.77	12.75	5.65
Sodium - mg	252.847	1.33	376.47	3.99
Vitamin A - RE	-60.259	-0.37	-67.63	-1.33
Vitamin C - mg	-8.149	-0.67	11.4	1.38
	LUNCH n=464			
Amount of food in grams	28.33	0.75	51.04	2.99
Food energy - kcal	64.62	1.97	88.2	4.3
Dietary fiber	-1.15	-2.75	-0.73	-3
Calcium - mg	-52.67	-2.31	-41.7	-3.69
Saturated fat - g	0.75	1.17	1.28	3.38
Total fat - g	1.99	1.14	4.75	4.1
Sodium - mg	-21.49	-0.3	57.89	1.23
Vitamin A - RE	-2.75	-0.03	-104.6	-4.25
Vitamin C - mg	-7.11	-1.76	-9.32	-5.32
	DINNER n=468			
Amount of food in grams	39.28	1.14	45.55	2.28
Food energy - kcal	88.99	2.49	132.87	5.71
Dietary fiber	-0.33	-0.77	-0.44	-1.5
Calcium - mg	3.69	0.16	3.4	0.25
Saturated fat - g	1.58	2.31	2.03	4.55
Total fat - g	7.13	3.89	9.07	6.92
Sodium - mg	-35.10	-0.43	62.82	1.21
Vitamin A - RE	-59.84	-1.23	-45.09	-1.44
Vitamin C - mg	-9.63	-2.39	-7.25	-3.35

Table 4. Nutrition Differences, by Type of Restaurant

Nutrient	Mean Difference	t-stat	Percent Change	Median Difference	Percent Increasing
TABLE SERVICE n=428					
Amount of food in grams	35.54	1.07	1.78	54.61	52.66
Food energy - kcal	108.79	3.12	5.99	92.48	54.1
Dietary fiber	-0.85	-1.9	-5.41	-0.77	46.52
Calcium - mg	-10.74	-0.49	-1.38	-8.12	48.57
Saturated fat - g	2.27	3.42	10.01	2.01	57.17
Total fat - g	8.1	4.31	12.08	7.14	60.25
Sodium - mg	114.49	1.36	3.61	130.35	54.1
Vitamin A - RE	-120.94	-2.11	-11.15	-49.33	47.34
Vitamin C - mg	-2.58	-0.63	-2.65	-1.31	48.36
FAST FOOD n=724					
Amount of food in grams	32.4	1.06	1.79	7.61	50.97
Food energy - kcal	72.71	2.6	4.05	47.81	53.73
Dietary fiber	-0.76	-2.35	-5.67	-0.39	47.79
Calcium - mg	-12.83	-0.69	-1.66	13.78	51.8
Saturated fat - g	1.47	2.75	6.33	1.38	55.8
Total fat - g	4.21	2.93	6.35	4.6	56.22
Sodium - mg	-28.67	-0.49	-0.97	-38.19	48.9
Vitamin A - RE	-74.45	-1.25	-8.9	-81.6	41.02
Vitamin C - mg	-11.87	-3.64	-12.83	-6.32	43.37

Table 5. Results for Children and Adults.

Nutrient	Mean Difference	t-stat	Percent Change	Median Difference	Percent Increasing
CHILDREN AND TEENS n=480					
Amount of food in grams	48.86	1.69	3.32	25.19	52.08
Food energy - kcal	97.6	3.55	5.94	65.9	55.63
Dietary fiber	0.23	0.67	2.06	0.01	50
Calcium - mg	-34.83	-1.67	-4.22	-6.82	49.17
Saturated fat - g	1.59	2.83	7.19	1.25	55.63
Total fat - g	4.51	3.06	7.49	5.08	57.08
Sodium - mg	-24.22	-0.41	-0.92	1.91	50.42
Vitamin A - RE	-64.94	-1.47	-8.25	-65.08	42.5
Vitamin C - mg	-10.94	-2.65	-11.6	-6.65	43.13
ADULTS n=732					
Amount of food in grams	32.4	1.06	1.79	7.61	50.97
Food energy - kcal	72.71	2.6	4.05	47.81	53.73
Dietary fiber	-0.76	-2.35	-5.67	-0.39	47.79
Calcium - mg	-12.83	-0.69	-1.66	13.78	51.8
Saturated fat - g	1.47	2.75	6.33	1.38	55.8
Total fat - g	4.21	2.93	6.35	4.6	56.22
Sodium - mg	-28.67	-0.49	-0.97	-38.19	48.9
Vitamin A - RE	-74.45	-1.25	-8.9	-81.6	41.02
Vitamin C - mg	-11.87	-3.64	-12.83	-6.32	43.37

Table 6. Results for Women and Men (Age>18)

Nutrient	Mean Difference	t-stat	Percent Change	Median Difference	Percent Increasing
WOMEN n=367					
Amount of food in grams	17.46	0.5	0.95	14.36	51.5
Food energy - kcal	36.63	1.04	2.35	34.47	51.77
Dietary fiber	-1.21	-2.92	-8.61	-1.04	45.5
Calcium - mg	-24.75	-1.16	-3.93	-11.62	47.96
Saturated fat - g	1.08	1.57	5.69	1.79	56.68
Total fat - g	3.91	2.04	6.84	4.07	56.95
Sodium - mg	70.97	0.85	2.62	22.17	51.23
Vitamin A - RE	-178.03	-2.77	-18.88	-116.37	41.69
Vitamin C - mg	-8.05	-1.96	-9.22	-1.09	48.23
MEN n=365					
Amount of food in grams	27.41	0.51	1.11	20.37	51.23
Food energy - kcal	123.27	2.38	5.46	66.71	53.7
Dietary fiber	-1.76	-2.83	-9.29	-1.04	45.48
Calcium - mg	30.6	0.97	3.58	54.31	54.79
Saturated fat - g	2.75	2.93	9.79	2.16	56.99
Total fat - g	9.27	3.51	10.96	7.2	59.73
Sodium - mg	54.47	0.48	1.4	43.85	51.51
Vitamin A - RE	-45.06	-0.41	-4	-44.19	46.85
Vitamin C - mg	-4.57	-0.92	-4.49	-4.86	45.48

Table 7. Results for Girls and Boys (Age <19)

Nutrient	Mean Difference	t-stat	Percent Change	Median Difference	Percent Increasing
			GIRLS n=223		
Amount of food in grams	22.88	0.7	1.65	22.83	52.02
Food energy - kcal	81.62	2.17	5.35	53.29	54.26
Dietary fiber	0.3	0.71	2.88	0.17	51.57
Calcium - mg	-42.7	-1.42	-5.57	5.68	50.22
Saturated fat - g	1.67	2.16	8.32	1.88	56.95
Total fat - g	5.53	2.71	10.11	6.02	59.19
Sodium - mg	-14.22	-0.18	-0.58	-72.3	49.33
Vitamin A - RE	-65.52	-0.98	-8.87	-64.51	42.15
Vitamin C - mg	-9.9	-1.77	-11.11	-6.47	43.5
			BOYS n=257		
Amount of food in grams	71.41	1.55	4.63	27.54	52.14
Food energy - kcal	111.46	2.81	6.38	81.24	56.81
Dietary fiber	0.17	0.32	1.45	-0.33	48.64
Calcium - mg	-28	-0.96	-3.2	-14.56	48.25
Saturated fat - g	1.52	1.89	6.38	1.01	54.47
Total fat - g	3.62	1.72	5.57	4.02	55.25
Sodium - mg	-32.9	-0.38	-1.17	10.58	51.36
Vitamin A - RE	-64.45	-1.1	-7.77	-65.48	42.8
Vitamin C - mg	-11.85	-1.97	-11.98	-7.15	42.8

Table 8. Differences for Minorities (African-American and Hispanic) and Others

Nutrient	Mean Difference	t-stat	Percent Change	Median Difference	Percent Increasing
MINORITIES n=259					
Amount of food in grams	95.33	1.91	5.8	19.37	51.74
Food energy - kcal	144.1	2.75	8.17	93.91	57.14
Dietary fiber	0.44	0.78	3.34	0.14	50.97
Calcium - mg	-1.86	-0.06	-0.27	23.96	53.67
Saturated fat - g	1.5	1.6	6.36	1.96	55.98
Total fat - g	5.44	2.05	8	4.07	55.21
Sodium - mg	-1.04	-0.01	-0.03	-40.71	48.65
Vitamin A - RE	-83.93	-1.64	-11.23	-60.74	46.72
Vitamin C - mg	-4.52	-0.81	-4.65	-8.12	43.63
OTHERS n=953					
Amount of food in grams	16.91	0.67	0.87	29.21	51.63
Food energy - kcal	71.78	3.02	3.96	53.88	52.99
Dietary fiber	-1.14	-3.78	-7.69	-0.74	46.27
Calcium - mg	-14.74	-0.93	-1.85	-3.93	49.63
Saturated fat - g	1.87	4.03	8.2	1.63	56.45
Total fat - g	5.87	4.64	8.86	5.71	58.55
Sodium - mg	37.13	0.7	1.22	41.55	51.63
Vitamin A - RE	-95.68	-1.83	-9.69	-76.6	42.71
Vitamin C - mg	-9.11	-3.18	-9.73	-4.19	45.86

Table 9. Results Split by Income, Adults

Nutrient	Full Day	t-stat	Meal, if Table Service	t-stat	Meal, if Fast Food	t-stat
HIGHER INCOME (n=180 & 119*)						
Amount of food in grams	25.21	0.50	124.91	4.06	28.03	0.73
Food energy - kcal	63.03	1.32	164.49	4.18	61.81	1.49
LOWER INCOME (n=116 & 182)						
Amount of food in grams	34.13	0.70	173.52	4.18	-27.78	-0.86
Food energy - kcal	66.20	1.36	217.80	4.08	59.35	1.72

*Sample sizes for table service and fast food.

Table 10Results Split by Normalized BMI, Adults.

Nutrient	Entire Day	t-stat	Table Service Meal	t-stat	Fast Food Meal	t-stat
LESS OVERWEIGHT (n=181 & 189)						
Amount of food in grams	-57.55	-1.47	145.09	4.66	-36.50	-1.16
Food energy - kcal	27.89	0.74	181.78	5.17	14.95	0.46
MORE OVERWEIGHT (n=121 & 125)						
Amount of food in grams	144.86	2.29	149.45	3.74	27.29	0.66
Food energy - kcal	116.90	1.88	193.82	3.44	124.50	2.78

Table 11. Differences Associated with Education

Nutrient	Mean Difference	t-stat	Percent Change	Median Difference	Percent Increasing
Adults, No College n=419					
Amount of food in grams	70.60	1.53	3.33	48.70	52.98
Food energy - kcal	107.40	2.62	5.83	87.62	55.13
Adults, Some College n=313					
Amount of food in grams	-39.08	-0.92	-1.77	-24.25	49.20
Food energy - kcal	44.36	0.92	2.22	-8.55	49.52
Childtren and Teens, Parents No College n=211					
Amount of food in grams	80.61	1.62	5.50	47.78	54.03
Food energy - kcal	120.94	2.66	7.34	95.32	58.77
Children and Teens, Parents Some College n=269					
Amount of food in grams	23.96	0.71	1.62	3.94	50.56
Food energy - kcal	79.29	2.35	4.83	35.32	53.16

Table 12. Gender Differences, Adults, by Income and Education.

	MEN			WOMEN		
	Difference	t	n	Difference	t	n
LOW INCOME			156			154
Grams	104.94	1.27		48.7	.85	
Calories	213.59	2.61		65.60	1.09	
HIGH INCOME			209			213
Grams	-30.45	-.43		-5.14	-.12	
Calories	55.86	.84		15.69	.37	
NO COLLEGE			177			186
Grams	44.26	.49		73.14	1.52	
Calories	100.55	1.33		123.78	2.36	
SOME COLLEGE			188			181
Grams	11.55	.18		-39.76	-.78	
Calories	144.67	2.03		-52.92	-1.15	

Table 13. Differences by Answers to Selected Questions Concerning Knowledge of Nutrition.

Question	YES			NO		
	Difference	t	n	Difference	t	n
1.DO YOU CONSUME TOO MANY CALORIES?						
Grams	-92.02	-1.26	161	82.74	1.56	270
Calories	37.79	.59		67.74	1.30	
2.ARE YOU OVERWEIGHT?						
Grams	-7.10	-.11	189	36.75	.64	242
Calories	25.65	.41		80.69	1.52	
3. NUTRITION IS ‘VERY IMPORTANT’. WHEN SHOPPING						
Grams	37.04	.70	278	-17.96	-.24	153
Calories	30.71	.62		103.50	1.46	
4. DO YOU USUALLY USE FOOD LABELS?						
Grams	46.28	.70	136	4.26	.08	295
Calories	76.06	1.10		47.56	.95	
5. ARE YOU CONFIDENT YOU UNDERSTAND LABELS?						
Grams	-132.96	-1.68	80	51.81	1.04	351
Calories	-51.00	-.57		81.06	1.79	