Maternal Employment and Household Food Production: Implications for Nutrition and Obesity

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Abstract

This paper explores the mechanisms through which maternal employment affects the quality of household nutrition and the implications for obesity of family members. Using comparable samples from the American Time Use Survey (ATUS) and the Continuing Survey of Food Intake by Individuals (CSFII), I find that maternal employment is negatively associated with time spent shopping for and preparing food and positively associated with the share of household food expenditure spent on food prepared away from home. This substitution of money for time in food consumption can have detrimental effects on the nutrition of both adults and children in the family. In married-couple families, I find that the quality of food-intake falls with maternal employment in all subgroups studied, and that obesity sometimes, but not always, rises with maternal employment. In single-mother families, however, my results suggest a weaker association between maternal labor supply, quality of food intake, and obesity. Overall, my findings suggest that maternal employment can explain very little of the time trend increase in obesity.

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1 Introduction

Whether families eat food prepared at home or away-from-home, family food consumption requires inputs of both time and money. The decisions families make regarding the allocation of time and money in food production depend on the availability of these limited resources as well as on family preferences. Furthermore, these decisions have implications for the quality of dietary intake of family members: substituting money for time in food production, by obtaining more food away-from-home instead of preparing food at home, results in a lower quality of food intake if the dietary quality of away-from-home food is inferior. Increased maternal employment substantially reduces the amount of time available for the mother to allocate between housework and leisure, while increasing household income, potentially inducing such a shift from food prepared at home towards away-from-home food. This paper answers two main questions. First, what is the relationship between maternal employment and the combination of time and money used in household food production? Second, what are the implications of this relationship for the quality of nutrition of household members and for their risk of being obese?

The quality of dietary intake is important since it may have considerable health impacts. For example, increased intake of saturated fat and cholesterol is linked to an elevated risk of coronary heart decease. Other examples include a negative relationship between the intake of vegetables and fruits and risk of lung cancer, and a positive relationship between the intake of animal fat and risk of colon cancer (Willett 1998). A recent study has also found an association between diet quality and academic performance of young children (Florence, Asbridge, and Veugelers 2008). Obesity, affected by the balance between energy intake and expenditure of a given individual, has risen dramatically in the U.S. over the last several decades (Flegal et al. 2002, Ogden et al. 2002) and is associated with cardiovascular disease, type 2 diabetes, and several cancers (Haslam and James 2005).

How the amount of time available for food preparation can affect diet quality is highlighted in Aguiar and Hurst (2005). They find that retirees, who experience a dramatic increase in the availability of non-market time at retirement, increase time spent on food production while spending a smaller amount of money on food.[1] They also find that quality of dietary intake increases at

[1] Brzozowski and Lu (2006) find qualitatively similar results for Canadian Retirees, and Gronau and Hamermesh (2006) calculate a higher time intensity for food production at retirement ages in both the U.S. and Israel.

retirement and that this change is not due to a shift in preferences. Substituting time for money in the production of food results in a better diet since food prepared at home, on average, is of higher dietary quality then away-from-home food. Compared to food prepared at home, away-from-home food has higher levels of total fat and saturated fat, together with lower levels of important nutrients such as dietary fiber, calcium, and iron (Lin, Guthrie, and Frazão 1999, Guthrie, Lin, and Frazao 2002).

Some studies have documented a negative association between maternal employment and time spent on household work in general (Robinson and Godbey 1999, Bianchi et al. 2000). More recently, work has focused on the negative association between maternal employment and time spent shopping for and preparing food. Mancino and Newman (2007) estimate that married or partnered women with two children who work full-time spend about 40 minutes less per day preparing food than do non-working women with the same marital status and number of children. Cawley and Liu (2007) find that maternal employment is associated with less time spent grocery shopping, cooking, and eating with children, and with a higher likelihood of purchasing prepared food.[2] Furthermore, using the same data source as mine for food intake analysis, but limiting the analysis to children alone and not separately analyzing single-mother families, Crepinsek and Burstein (2004) present evidence that maternal employment is negatively associated with the quality of American children's diets. Finally, a link between the average hours a mother worked per week since the child's birth and the child's probability of being overweight is found by Anderson, Butcher, and Levine (2003). Other papers linking maternal employment to childhood obesity include Ruhm (2006) and Courtemanche (2007) in the U.S., and Chia (2008) in Canada.

My paper offers several contributions to the existing literature. First, it introduces a theoretical framework conceptualizing the tradeoff between time and money in household food production and the implications for the nutrition of family members. Second, while Cawley and Liu (2007) and Mancino and Newman (2007) have focused separately on time use, and others have focused separately on dietary quality and/or obesity (Crepinsek and Burstein 2004, Anderson, Butcher, and Levine 2003, Ruhm 2004, Courtemanche 2007), I provide a more complete picture using demographically comparable samples addressing both aspects. Finally, and differently from the literature until now, I examine not only the diets of children, but also of parents, and provide evidence on

[2]Both of these papers use the American Time Use Survey.

important differences between married-couple families and single-mother families.

My model in Section 2 is an adaptation of Becker's model of household production (Becker 1965) to the specific case of food production, taking into account nutrient intake and other food characteristics. I then test the implications of my model: Using the American Time Use Survey (ATUS) 2003-2005, I estimate the association between maternal employment and time spent in food production. Using the Continuing Survey of Food Intake of Individuals (CSFII) 1994-1996, I estimate the association between maternal employment and expenditure on away-from-home food; the association between maternal employment and household nutrition and obesity; and the underlying relationship between expenditure on away-from-home food and household nutrition and obesity. Both these datasets are described in Section 3.

My empirical analysis includes only families with at least one child under 18 and, in the case of married-couple families, I limit the analysis to families in which the husband works full-time.[3] I define three types of married-couple families and three types of single-mother families according to the level of maternal employment: no work, part-time work (less than 35 hours usually worked per week), and full-time work (at least 35 hours usually worked per week).

My results suggest that total time spent shopping for and preparing food in both married-couple families and single-mother families falls with the level of maternal employment: married mothers and single mothers who work full-time spend about 30 minutes less per day on shopping for and preparing food than do non-employed mothers with comparable demographics. Furthermore, the share of food expenditure spent on food prepared away-from-home, at fast food restaurants or at restaurants with table service, rises with the level of maternal employment: married-couple families and single-mother families in which the mother works full-time spend 4 percent and 7 percent more, respectively, of their food expenditure on away-from-home food than do households with comparable demographics in which the mother does not work.

Next, I find that the quality of food intake of family members, as measured by the Healthy Eating Index (HEI) and the densities (per 1,000 calories) of 11 important nutrients, falls with maternal employment in married-couple families: the HEI falls by about 2 points for members of married-couple families in which the wife works full-time, as compared to members of married-

[3]In both datasets I use, the husband does not work full-time in less than 10 percent of married-couple families with at least one child under 18.

couple families in which the wife does not work.[4] In addition, members of married-couple families are sometimes, but not always, more likely to be obese. However, there is no consistent association between maternal employment and the quality of food intake and obesity prevalence in single-mother families. Overall, according to my results, the relationship between maternal employment and obesity of family members seems to explain very little of the time trend increase in obesity.[5]

2 A Model of Household Food Production and Nutrition

In this section I introduce a simple theoretical model to explore the decisions households make regarding time and money inputs in household food production, and how these decisions generate a relationship between maternal labor supply and the quality of food-intake of family members. Since the focus of this paper is on maternal employment, I assume for the sake of simplicity that the time allocation of the father, in the case of married-couple families, is predetermined. Furthermore, I assume that maternal labor supply H is exogenous to the food decision making process. Some papers, such as Anderson, Butcher, and Levine (2003), note that in theory maternal employment might be endogenous to health related outcomes. For example, mothers who put more importance on nutrition, and believe that food prepared at home is healthier, may decide to work less. However, Cawley and Liu (2007) and Courtemanche (2007) mention that, in general, the literature has not been able to reject exogenous maternal employment in this context, and have suggested that selection bias, if exists, is minimal.

The household derives utility from food consumed by its members, as well as from a composite nonfood good C and from leisure L. However, almost any food item offers various advantages and, possibly, disadvantages, depending on its characteristics. These characteristics include the nutrients provided by the individual foods, but also the taste and appearance of the food, as well as attributes of the eating experience itself. For example, characteristics of a scrambled egg include the amounts of calories, fat, protein and carbohydrates it provides, but also its taste and how it looks, and whether it is eaten at home or at a restaurant. Thus, instead of the foods themselves, M different food characteristics Z_i, $i = 1, \ldots, M$, provided by the foods consumed, enter the joint

[4] Nutrient results are displayed in a separate web appendix at http://econ.jhu.edu/jobmarket/2008/BenShalomY.

[5] The fraction of kids ages 6 to 11 who are overweight has increased from 6.5 percent in the late 1970s to 15.3 percent in 2000. For teens ages 12 to 19 the increase over the same time period was from 5 percent to 15.5 percent (Ogden et al. 2002). For adults ages 20 to 74 obesity prevalence increased from 15 percent to 31 percent (Flegal et al. 2002).

utility function directly:

$$U = U(Z_1, Z_2, \ldots, Z_M, C, L) \tag{1}$$

Let the first K characteristics $Z_i, \ldots, Z_K$ be nutrients. Similar to Devaney and Moffitt (1991), J different foods consumed provide these nutrients, with each food F_j, $j = 1, \ldots, J$ yielding a_{ij} of nutrient Z_i per unit. The total amount consumed of each nutrient is therefore:

$$Z_i = \sum_{j=1}^{J} a_{ij} F_j, \quad i = 1, \ldots, K \tag{2}$$

The other $M - K$ food characteristics in utility equation (1) are also functions of the J different foods, but are not necessarily linear combinations:

$$Z_i = Z_i(F_1, \ldots, F_J), \quad i = K + 1, \ldots, M \tag{3}$$

The different foods are produced with a combination of goods X_j, either groceries or away-from-home food, and time T_j that is necessary for grocery shopping and food preparation or for obtaining away-from-home food. The food production functions are specific to the kind of food produced:

$$F_j = F_j(X_j, T_j), \quad j = 1, \ldots, J \tag{4}$$

In the scrambled eggs example, if prepared at home, X_j represents the groceries such as eggs and oil, while T_j is the amount of time spent on food preparation, including time spent shopping for the necessary groceries and related travel time. If the scrambled eggs were eaten at a restaurant, X_j represents the actual meal eaten at the restaurant and T_j is the time spent traveling to the restaurant and back.

Let H be the mother's hours of market work, W her wage, M non-labor income (including the father's labor income in married-couple families), P_j the price of X_j relative to the price of the composite good C, T total time available, and Y total household income. The household's time constraint is therefore:

$$T = L + H + \sum_{j=1}^{J} T_j \tag{5}$$

and its money constraint is:

$$Y = M + WH = C + \sum_{j=1}^{J} P_j X_j \tag{6}$$

Equation (5) states that total time available is allocated between leisure, non-market work, and time in food production. Equation (6) states that total household income is allocated between money spent on goods in food production and expenditure on all other goods.

In such a setting, given wage W and non-labor income M, differences in prices P_j, labor supply H, and income Y, will lead to differences in the combination of time and money inputs used in household food production. The J different demand functions for time inputs and J different demand functions for goods in food production, all as functions of prices, maternal employment, and income, can be written as follows:

$$T_j = T_j(P_1, P_2, \ldots, P_J, H, Y) \tag{7}$$

$$X_j = X_j(P_1, P_2, \ldots, P_J, H, Y) \tag{8}$$

I substitute the demand functions for time and goods in household food production, equations (7) and (8), into the individual food production equations (4) to obtain J reduced form individual food demand functions. These equations can in turn be substituted into the individual nutrient equations (2), to get K different reduced form nutrient equations:

$$Z_i = Z_i(P_1, P_2, \ldots, P_J, H, Y), \quad i = 1, \ldots, K \tag{9}$$

Higher levels of maternal labor supply will leave less available time for food production, but also offer a higher level of labor income. Higher H, therefore, will lead a household to use more money relative to time in household food production. Food consumption is thus shifted from the production of relative time-intensive foods prepared at home to relatively goods-intensive food obtained away-from-home. This food consumption decision has consequences for the intake of nutrients, and for other food characteristics, if the production of nutritious meals is relatively more time-intensive than that that of less nutritious meals.

Finally, if obesity status of family members is related to maternal employment through nutrition and/or other mechanisms, we can write down a reduced form equation for the probability of being

obese:

$$P(Obese) = g(P_1, P_2, \ldots, P_J, H, Y) \tag{10}$$

3 Data

I use the the American Time Use Survey (ATUS) 2003-2005 to estimate the association between maternal employment and time spent in food production, equation (7), and the Continuing Survey of Food Intake by Individuals (CSFII) 1994-1996 to estimate the association between maternal employment and money in food production, equation (8); the association between maternal employment and household nutrition, equation (9); the association between maternal employment and obesity, equation (10); and the relationship between expenditure on away-from-home food and nutrition/obesity. The ATUS and relevant variables are described in section 3.1. The CSFII and relevant variables, as well as information about the assessment of the quality of dietary intake and of obesity prevalence, are described in section 3.2.

3.1 The American Time Use Survey (ATUS)

Sponsored by the Bureau of Labor Statistics and conducted by the U.S. Census Bureau, the ATUS is a cross-sectional survey representative of all residents above 15 years of age living in U.S. households, not including active military personnel and institutionalized individuals (U.S. Bureau of Labor Statistics 2000). The ATUS sample is drawn from the Current Population Survey (CPS), with CPS households becoming eligible for selection into the ATUS sample two months after their last CPS interview. Out of each CPS household selected for inclusion in the ATUS sample, one ATUS respondent is randomly selected from household members over the age of 15. Sampling weights are calculated to account for oversampling of certain demographic groups, oversampling on weekend days relative to weekdays, and variation of response rates over demographic groups and days of the week. ATUS respondents are asked over the phone to recall how they spent their time from 4 AM of the previous day until 4 AM of the interview day. For each activity mentioned, the duration is recorded and the activity itself is coded using a three tier categorization system, resulting in a 6-digit classification code for each activity. In addition, CPS variables are available for all members of the ATUS respondent's household.

I pool the first three annual ATUS waves of 2003, 2004, and 2005, and restrict the sample to married-couple families or single-mother families where the parents are ages 21 to 55 and at least one child is under 18 years old. In addition, I require that the household does not include any other individuals apart from parents and their children and that the father, in married-couple families, works full-time (35 hours or more usually worked per week at all jobs).[6] Finally, I exclude households for which the ATUS respondent was not the father or the mother. The resulting analytical sample consists of 9,638 married-couple families and 2,174 single-mother families.

All households in my sample, regardless of whether the ATUS sample-person is the mother or the father, are classified according to the mother's CPS variable "hours usually worked per week" into three different categories of maternal employment: no work (hours usually worked per week at all jobs is 0), part-time work (1-34 hours usually worked per week at all jobs combined), and full-time work (35 hours or more usually worked per week at all jobs combined). Out of married-couple families, in 3,278 (34 percent) the mother does not participate in the labor force, in 2,026 (20 percent) the mother works part-time, and in 4,334 (46 percent) the mother works full-time. Out of single-mother families, in 526 (26 percent) the mother does not participate in the labor force, in 280 (12 percent) the mother works part-time, and in 1,368 (62 percent) the mother works full-time.

The means of ATUS/CPS variables used as independent variables in Section 4 are presented in the upper panel of Table 1, by family type and status of maternal employment. In married-couple families, mothers who work part-time work an average of 23 hours per week, while mothers who work full-time work an average of 43 hours per week. However, average usual weekly work hours for fathers are flat at around 46 hours per week, regardless of the mother's level of employment. In addition, parents in families with working mothers are slightly older and their families are more likely to be in the top three income brackets, although the differences between families where the mother works part-time and families where the mother works full-time are not substantial in these categories. Finally, the average number of children falls with maternal employment, employed mothers are more likely to have completed at least one year of post-secondary education, and Hispanic mothers are relatively less likely to work.

In single-mother families, mothers who work part-time work an average of 24 hours per week

[6] Fathers do not work full-time in only 10 percent of my final ATUS sample of married-couple families.

and mothers who work full-time work an average of 41 hours per week. Working single mothers are only slightly older than single mothers who do not participate in the labor-force. While almost all single-mother families are in the three lowest income brackets, the probability of being in a higher income bracket rises with the level of maternal employment. In addition, single-mothers who work full-time have fewer children than single-mothers who do not work, single-mothers who work more are more highly educated, and black mothers are over-represented in single-mother families. Black single-mothers are also relatively less likely to be working.

3.1.1 Time Spent Shopping for and Preparing Food

Since either the mother or the father, but not both, were interviewed about their time use in my sample, I analyze their use of time in food production separately. However, my definition of food-time is the same for both and includes minutes spent on food and drink preparation, grocery shopping, and related travel.[7] In the lower panel of Table 1, we can see that the sex of the ATUS respondent, as well as the weekend/weekday distribution of the interview day, is balanced across levels of maternal employment. While about 50 percent of the interviews were conducted on weekends, the survey weights correct the time-use means for this imbalance. We can also see that non-working married mothers spend an average of 123 minutes per day on food preparation activities, compared to 91 minutes for mothers who work part-time and 73 minutes for mothers who work full-time. Fathers, however, do not compensate much for this pattern, with fathers married to mothers who work full-time contributing only 5 minutes more per day, on average, than fathers married to stay-at-home mothers.[8] Single-mothers, relative to married mothers at the same employment level, spend much less time in food preparation, with single-mothers who do not work spending an average of 96 minutes per day on food preparation activities, compared to 60 minutes for single-mothers who work part-time, and 59 minutes for single-mothers who work full-time.

[7] Food and drink preparation and related travel ATUS activity codes: all activities starting with 0202 in 2003; all activities starting with 0202 and activity 170202 in 2004; all activities starting with 0202 and activity 180202 in 2005. Grocery Shopping and related travel ATUS activity codes: activities 070101 and 170701 in 2003 and 2004; activities 070701 and 180701 in 2005.

[8] Fathers may, instead, be contributing more in other categories of household work.

3.2 The Continuing Survey of Food Intakes by Individuals (CSFII)

Conducted by the Agricultural Research Service of the U.S. Department of Agriculture, The CSFII 1994-1996 measured the kinds and amounts of food eaten by individuals representing the population of noninstitutionalized individuals in all 50 states and Washington, DC (Tippett and Cypel 1997).[9] In each survey year, a nationally representative sample of individuals of all ages, sometimes more than one per household, was asked to complete 24-hour dietary recalls on 2 nonconsecutive days, spaced 3 to 10 days apart, with the sample persons being selected using a complex, multistage, area probability sample design. If the sample person was a child under the age of 6 or unable to report for him or herself due to physical or mental limitations or because of illness, a knowledgable household adult would complete the dietary recall instead.

The food items recorded in the 24-hour dietary recalls were then matched with a food coding database containing 7,300 8-digit codes, each denoting a complete description of the food item and, if relevant, the preparation method. Using further information from a recipe database, containing entries for each unique food in the food coding database, and a survey nutrient database, the nutritive value for each consumed food item was calculated. Aggregating nutritive values over the food items consumed by the CSFII sample person in the last 24 hours results in measures of daily intake of food energy and nutrients and food components such as protein, total fat, dietary fiber, and vitamin A. Apart from the food intake data collected for sample persons, reported measures of the height and weight of sample persons were collected and information was recorded about the educational and employment status of all household members 15 years and above, as well as household income, food assistance program participation, food expenditures, and other food-related practices.

As with the ATUS data, I restrict the sample to married-couple families or single-mother families where the parents are ages 21 to 55 and there is at least one child under 18 years old. I also require that there be no other individuals apart from parents and their children in the household and that, in married-couples, the father works full-time.[10] The resulting analytical sample includes 2,121 married-couple families and 471 single-mother families. Again, I classify all CSFII households

[9] Although more recent food intake surveys are available for 2001-2002 and 2003-2004, these were integrated with the National Health and Nutrition Examination Study (NHANES), conducted by the National Center for Health Statistics (NCHS). Unfortunately, information about household members other than the sample person, crucial to this study, is not included in NHANES.

[10] Fathers do not work full-time in only 9 percent of my final CSFII sample of married-couple families.

according to the mother's "usual hours of work per week" variable into three categories: no work (hours usually worked per week at all jobs is 0), part-time work (1-34 hours usually worked per week at all jobs combined), and full-time work (35 hours or more usually worked per week at all jobs combined). Out of married-couple families, in 728 (31 percent) the mother does not participate in the labor force, in 461 (23 percent) the mother works part-time and in 932 (46 percent) the mother works full-time. Out of single-mother families, in 177 (32 percent) the mother does not participate in the labor force, in 60 (12 percent) the mother works part-time and in 234 (56 percent) the mother works full-time.

The means of CSFII household level variables used as independent variables in Section 4 are presented in Table 2, by family type and level of maternal employment. In married-couple families, mothers who work part-time work an average of 21 hours per week and mothers who work full-time work an average of 43 hours a week. Average weekly work hours for fathers are nearly constant at around 48 hours per week, and average annual income rises with the level of maternal employment from $45,000 when the mother does not work to $56,0000 when the mother works full-time. In addition, the average number of children falls with maternal employment, and employed mothers are more likely to have completed at least one year of post-secondary education.

In single-mother families, mothers who work part-time work an average of 23 hours per week and mothers who work full-time work an average of 43 hours a week. As with married-couple families, the average income of single-mothers rises with maternal employment, though income levels are much lower. In addition, single-mothers who work full-time have fewer children than single-mothers who do not work, and single-mothers who work more are more highly educated on average.

3.2.1 Expenditure on Away-From-Home Food

To facilitate the analysis of consumption of away-from-home foods, I first combine monthly expenditure at both grocery stores and specialty stores during the last three months to get a variable that approximates monthly expenditure on food prepared at home during the last three months. This variable is only an approximation mainly since relatively less time-intensive pre-prepared food can also be purchased at these stores. I then combine monthly expenditure at fast food or carry-out places on food eventually eaten at home, together with monthly expenditure on food bought

and eaten away-from-home, to get a variable that approximates monthly expenditure on away-from-home food. Finally, I compute the share of food expenditure spent on away-from-home food (away-share).

The means of these constructed monthly food expenditure variables are also presented in Table 2. We can see that the share of food expenditure spent on away-from-home food rises with maternal employment, being 22 percent of food expenditure when mother does not work, 25 percent of food expenditure when the mother works part-time, and 28 percent when she works full-time. In single-mother families, the share of food expenditure spent on food prepared away-from-home is 14 percent of food expenditure when mother does not work, 16 percent of food expenditure when the mother works part-time, and 26 percent when she works full-time.

3.2.2 Assessing Nutrition

To assess the quality of the food intake of sample persons included in my analysis, I use the Healthy Eating Index (HEI), a measure of diet quality that assesses conformance to federal dietary guidance, as well as total energy intake and the densities (per 1,000 Kcal) of 11 important nutrients and food components. The U.S. Department of Agriculture (USDA) primarily uses the HEI to monitor the diet quality of the U.S. population and the low-income subpopulation. Furthermore, the USDA's Center for Nutrition Policy and Promotion (CNPP) has used the data collected in the CSFII 1994-96 to compute the 1995 version of the HEI for each of the two 24-hour food intake diaries recorded for each sample person (Bowman et al. 1998).[11] The index is comprised of ten different components, each worth 0-10 points, that sum up to a maximum possible score of 100 points (Figure 1). The first five components of the HEI measure how closely a person's diet follows the USDA's Food Guide Pyramid serving recommendations for grains, vegetables, fruits, milk, and meat, while the rest of the components are related to the intake of fat and saturated fat, cholesterol, sodium, and the variety of the person's diet.

The USDA classifies a diet with an HEI score below 51 as "Poor", between 51 and 80 as "Needs Improvement", and above 80 as "Good". However, the diets of the vast majority of the population, more than 70 percent in 1994-1996, fall in the "needs improvement" category. Furthermore, the

[11] A new version of the HEI, adhering to updated federal dietary guidelines, has recently been developed. Nevertheless, it makes sense to use the measure that was current in 1994-1996, since it reflects the dietary guidelines published at that time.

differences in mean HEI scores along important demographic variables are modest. Bowman et al. (1998) report a difference of less than 5 points between the mean HEI of people with household income that is 51 to 100 percent of the poverty line and the mean HEI of those in households with income above 300 percent of the poverty line. In addition, the difference in mean HEI between people with 4 years of high school or less and those with more than four years of college is just below 7 HEI points.

In both the descriptive analysis below, as well as in the econometric analysis of the next section, I look separately at six sex-age groups in the case of married-couples: boys ages 6 to 11, boys ages 12 to 17, fathers ages 21 to 55, and their three female counterparts. In the case of single-mother families, I am naturally left with five such sex-age groups. The upper panels of Tables 3 and 4 show the mean HEI scores in these sex-age groups for married-couple families and for single-mother families.

In married-couple families, in all sex-age groups, mean HEI falls with the level of maternal employment. For example, the mean HEI for a girl age 6 to 11 is 69.3 if her mother does not work, 67.5 if the mother works part-time, and 66.1 if the mother works full-time, the mean in the latter case being statistically different from the mean in the first case at the 5 percent significance level. Also, the negative association between maternal full-employment and mean HEI is largest for teenagers. For teenage boys, mean HEI is 3.5 points lower if the mother works full-time, as compared to when she does not work, which is roughly 0.4 of a standard deviation. For teenage girls, the equivalent HEI difference is 4.3 points which is about 0.5 of a standard deviation. For both of these groups, the differences are statistically significant at the 5 percent level. In single-mother families, the pattern of the HEI group means is not as consistent. Part of this result could be due to the smaller sample sizes, but it could also be that differences in income and education of the mother play a larger role in single-mother families, as compared to married-couple families, since the mother is more likely to be the only supporting adult. Thus, the net effect of the differences in available time for food preparation, in the case of single-mothers, are likely to be smaller relative to those in income and education. If anything, some of these results suggest that children and mothers in single-mother families are better off if the mother participates in the labor force. For example, among young females ages 6 to 11, point estimates are 63.4 if the mother does not work and 66.9 if the mother works full-time. However, this difference is not statistically significant.

I also assess the nutritive quality of the dietary intakes of the members of married-couple families and single-mother families by looking at total energy intake as well as the densities (per 1,000 Kcal) of 11 important nutrients and food components: fat and saturated fat, cholesterol, calcium, vitamin A, vitamin B6, vitamin C, iron, fiber, folate, and riboflavin. The various nutrient densities are averaged over the two food-diary days for each CSFII sample person. The means of these nutrient densities by sex, age, and family type, as well as mean energy intakes, are presented in a separate web appendix, and generally show a pattern that is consistent with the HEI results above, where the quality of food intake falls with maternal employment in married-couple families, but not in single-mother families.[12] More specifically, in married couple families, mean densities of total fat and saturated fat rise with maternal employment in most sex-age groups, and mean densities of vitamin A, vitamin C, vitamin B6, and folate fall with maternal employment in most sex-age groups. In addition, mean densities of calcium and iron fall with maternal employment for female family members and the mean density of fiber falls for male members. In single-mother families, indications that the quality of food intake actually increases with maternal employment are evident in lower densities of cholesterol, fat and saturated fat, and in higher fiber density for female diets. Total energy intake, however, does not generally show a consistent pattern in the case of married-couples. In the case of single-mother families, however, energy intake is significantly lower for male teenagers and for mothers themselves, when the mother works, as compared to when she does not work.

3.2.3 Adult and Childhood Obesity

I use reported height and weight of CSFII sample persons to compute their Body Mass Index (BMI), calculated as the weight in kilograms divided by the square of height in meters. An adult with BMI over 30 is defined as obese, while children and teens are classified as obese if their BMI is at or above the 95th percentile for their age and sex, as shown in the Centers for Disease Control and Prevention's (CDC) Year 2000 growth charts (Kuczmarski et al. 2002).

The lower panels of Tables 3 and 4 show the obesity prevalence in each of the 6 sex-age groups. The pattern for obesity prevalence across sex-age groups is not as consistent as it is for the HEI. However, apart from boys ages 6 to 11 and females age 12 to 17, the point estimate for obesity

[12]The nutrient web appendix can be found at http://econ.jhu.edu/jobmarket/2008/BenShalomY.

prevalence is higher for members of married-couple families where the mother works full-time, as compared to families where the mother does not work. For fathers in married-couple families, for example, this difference is statistically significant at the 1 percent level, with a prevalence rate of 23 percent if the mother works full-time, compared to 15 percent if the mother does not work. In single-mother families, some of the results suggest that obesity falls with maternal employment. For example, the obesity prevalence is 40 percent for male teens if the mother does not work, compared to 19 percent if she works full-time (a statistically significant difference at the 10 percent level), and the respective numbers for female teens are 16 percent and 8 percent. In addition, 35 percent of stay-at-home single-mothers are obese, compared to only 18 percent of single-mothers who work full-time (a statistically significant difference at the 5 percent level).

4 Econometric Analysis

4.1 Maternal Employment and Time in Food Production

In this section I analyze the relationship between maternal employment and time spent in food preparation by both mothers and fathers in married-couple families, and by mothers in single-mother families. I first outline the empirical strategy used and then proceed to present my results.

Ideally, one would have information on both the time and good inputs used in the production of a certain food F_j, allowing for the joint estimation of demand equations (7) and (8). However, such data does not exist. Instead, aggregating over all J different foods gives the total time spent in household food production:

$$T_F = \sum_{j=1}^{J} T_j \tag{11}$$

Substituting the individual demand equations for time-inputs (7) into the food-time equation (11) results in a reduced form equation for T_F:

$$T_F = T_F(P_1, P_2, \ldots, P_J, H, Y) \tag{12}$$

For a given household, an increase in labor supply H will decrease the amount of time available for food production, while increasing the amount of money available, leading to the substitution of money for time in household food production. To estimate the effect of maternal employment

on total time spent in food production, recognizing that price levels are generally constant for cross-sectional data, I estimate the following linear regression equation:

$$T_{Fi} = \alpha_0 + \alpha_1 PT_i + \alpha_2 FT_i + X_i\beta + \epsilon_i \tag{13}$$

where "i" denotes household i, PT_i is an indicator for part-time maternal employment, FT_i is an indicator for full-time maternal employment, X_i is a vector of other variables thought to affect time shopping for and preparing food, and ϵ_i is an error term.[13]

When household income is not included in X, coefficients α_1 and α_2 represent the combined effects of (a) less available time and (b) more available money, when the mother works part-time or full-time, as compared to staying out of the labor-force, all other things equal. Of course, variation in hours worked exist both among mothers who work part-time and those who work full-time. In addition, wage differences affect observed differences in income, as do differences in non-labor income, which also include the father's earnings in the case of married-couple families. Thus, coefficients α_1 and α_2 represent average effects across different hours of work in each maternal employment category, as well as across differences in wages and in non-labor income, conditional on the variables included in X. If total household income is included in X, these coefficients represent averages across different hours of work in each category of maternal employment, conditional on total household income. Such an interpretation could be of interest if we want to know how families with similar household income differ in their well-being due to differences in available non-market time. I will estimate equation (13) first without and then with total household income included in X.

Several other factors are expected to affect time spent on preparing and shopping for food by parents in married-couple families and by single-mothers. A family with a larger number of children, all other things equal, will require a larger amount of food which will require, in turn, an increase in the amount of time spent on food preparation as well as an increase in food expenditure. Furthermore, the age-composition of the children in the family might affect the amount of food consumed since older children eat larger quantities of food. The mother's education level may

[13]This specification (as well as subsequent ones) assumes that the level of maternal employment is exogenous. As mentioned in Section 2, the literature has not been able to reject exogenous maternal employment in this context. Furthermore, the CSFII, used for subsequent regressions, lacks suitable instruments for maternal employment.

be positively associated with cooking and shopping skills, allowing a more highly skilled mother to provide the same amount of food as a low skilled mother in a shorter amount of time. On the other hand, a more highly educated mother could be better informed about the importance of nutritious food and choose, therefore, to prepare relatively time-intensive food. In addition, families of different ethnicity may differ in their food culture, resulting in differences in eating habits and food preparation methods that could lead to differences in time spent on food preparation.

To verify that the association between maternal employment and time spent in household food production still exists when accounting for the various factors mentioned above, I run three versions of OLS regressions of equation (13) for married-couple families and for single-mother families.[14] Since either the mother or the father, but not both, are the ATUS respondent in married-couple families, I estimate equation (13) separately for mothers and fathers in these families. In both mothers' and fathers' regressions, PT and FT are indicators of the mothers' level of employment. In the case of fathers, the coefficients on these maternal employment indicators estimate how fathers adjust their time spent in food preparation when their wife works part-time or full-time, as compared to when the wife does not work. I choose to run separate regressions for married-couple families and single-mother families, since the presence of a father in married-couple families may affect the mother's time spent preparing food in ways that are not fully captured by simply including a dummy variable for single-mother families as an independent variable in these regression.

For both family types, X includes a quadratic term in the respondent's age, total number of children, number of children ages 0 to 5 and 12 to 17, and dummy variables for the mother's education, as well as for race, year, and day of the week. Version (1) of equation (13) includes only PT and FT as independent variables, version (2) adds the X variables, and version (3) includes also income-bracket indicators.[15] The results of the regressions for mothers in both married-couple families and single-mother families are presented in Table 5, and the results for fathers in married-couple families are presented in Table 6.

[14] In time-use data many respondents report spending zero time on a certain activity. Some papers use Tobit regression to deal with this issue (Sayer, Bianchi, and Robinson 2004, Mancino and Newman 2007), others (Aguiar and Hurst 2005, Cawley and Liu 2007) separately estimate a binary choice model for reporting a positive amount of time spent on a certain activity and then model time-use in this activity for the sample of individuals reporting a positive amount of time spent. However, in the case of time spent preparing or shopping for food, zero observations are simply a random event due to being interviewed on a randomly chosen weekday, and estimates from a linear regression should not be biased.

[15] A continuous household income variable is not available in the ATUS.

In married-couple families, mothers who work part-time and full-time spend about 32 minutes and 50 minutes less per day, respectively, on food preparation, as compared to mothers who do not work (first column of Table 5). Adding demographic variables to the regression (column 2) reduces the coefficients on mothers who work part-time and full time to -27 minutes and -43 minutes respectively. The results also suggest that maternal food-time rises with the total number of children in the family. In addition, mothers with at least 12 years of education spend about 30 minutes less per day on food preparation than mothers who have not finished 12 years of schooling, but there is no substantial difference between those with 12 years of education and those who have completed at least one year of post-secondary education. Adding the income-bracket indicators to the regression (column 3) does not result in any substantial changes in the coefficients from column 2, suggesting that the effects of income are largely captured by the level of maternal employment and the other demographic variables. In a similar analysis of fathers in married-couple families (Table 6) we can see that although fathers do compensate for their wife's employment in minutes spent on food preparation, this compensation is limited to just over 4 minutes per day when the mother works part-time and around 7 minutes per day if the mother works full-time.[16] Interestingly, fathers' food-time is positively associated with the number of children age 0-5 in the family, indicating that fathers tend to help out more when children are young.

While working single-mothers spend about 30 minutes less per day on food preparation than single-mothers who do not work (Table 5), I do not detect a substantial difference in time spent preparing food between single-mothers who work part-time and those who work full-time. In addition, education does not seem to make much of a difference for food-time in the case of single-mothers and, as in the case of married couples, the effect of income is not substantial, apart from the negative coefficient for the highest income bracket.

4.2 Maternal Employment and Money in Food Production

In this section I analyze the relationship between maternal labor supply and the share of food expenditure spent on away-from-home food. Again, due to the nature of the data available, I aggregate over the J different foods. I assume that foods F_1 to $F_{J'}$ are produced at home and that foods $F_{J'+1}$ to F_J are away-from-home foods obtained at regular and fast-food restaurants, or are

[16] Fathers might be compensating more in other household activities not examined here.

home-delivered foods. Thus, food expenditure is allocated between expenditure on food prepared at home:

$$E_H = \sum_{j=1}^{J'} P_j X_j \tag{14}$$

and expenditure on away-from-home food:

$$E_A = \sum_{j=J'+1}^{J} P_j X_j \tag{15}$$

If increased maternal employment leads to substitution of money for time in household food production, by eating relatively more food away-from-home than food prepared at home, we should expect to see a positive association between the level of maternal employment and the share of food obtained away-from-home. I approximate this share by using the share of food expenditure spent on away-from-home food (away-share):

$$AS = \frac{E_A}{E_H + E_A} \tag{16}$$

Substituting the individual demand equations for goods inputs (8) into equations (14) and (15) gives us reduced form expenditure equations. These can then be plugged into equation (16) to get a reduced form equation for the away-share:

$$AS = AS(P_1, P_2, \ldots, P_J, H, Y) \tag{17}$$

Again, an increase in labor supply H will decrease the amount of time available for food production, while increasing the amount of available money, leading to substitution of money for time in household food production. I use the following linear regression equation to estimate the association between maternal employment and this share:

$$AS_i = \alpha_0 + \alpha_1 PT_i + \alpha_2 FT_i + X_i\beta + \epsilon_i \tag{18}$$

where i, PT_i, FT_i , X_i, and ϵ_i are as defined for the food-time regression Equation (13), and AS is measured at the household level. Coefficients α_1 and α_2 again represent the effect of maternal employment status, averaged across differences in actual hours worked and wages and conditional

on the variables included in X. As in the food-time analysis, I run three versions of an OLS regression, adding the demographics vector X in version (2) and then adding the log of annual household income in version (3). Again, I run separate regressions for married-couple families and single-mother families. The results of these regressions are presented in Table 7.

Estimation of the initial regression for married couples, without controlling for demographics and income, finds that a married-couple family where the mother works part-time or full-time spends 3 percentage points and 7 percentage points more, respectively, on away-from-home food as a share of total food expenditure, than does a family where the mother does not work (column 3). However, these differences are partially due to demographic disparities between the different family types. Adding demographic controls and log income eventually brings the estimated maternal employment coefficients down to 2 percentage points, if the mother works part-time, and 4 percentage points if the mother works full-time (column 3). These estimates are all statistically significant at the 5 percent level. From column 3 we can also see that the total number of children has a negative effect on the away-share, and that the number of young children has an additional negative effect which is independent of the total number of children. The number of teenagers, however, is associated with an increase in the away-share. In contrast with the food-time analysis, I find here a significant coefficient for income in married couple families, with an income elasticity of .046, so that doubling income is associated with a 4.6 percentage point increase in the away-share. However, spending a larger share of food expenditure on away-from-home food when income is higher does not necessarily mean eating more away-from-home food relatively to food prepared at home. It can also be that the quality of food obtained away-from-home rises with income, leading to a relatively larger share of this kind of food in total food expenditure, when quality and price are positively correlated.

The findings for married-couple families are largely reproduced in single-mother families. While initially the coefficient on full-time employment indicates that their away-share is 14 percent higher than that of single-mothers who do not work, this coefficient is reduced to 7.4 percentage points after adding the demographic controls and log income. However, there is no effect of part-time work on the away-share. Again, the total number of children (but not the number of young children) is negatively related to the share of food expenditure spent on away-from-home-food, and the income elasticity is identical to the one for married-couple families, at .046.

4.3 Maternal Employment, Quality of Food Intake, and Obesity

In the previous two sections I have shown that maternal employment in both married-couple and single-mother families is associated with a decrease in the amount of time spent shopping for and preparing food and an increase in the share of food expenditure spent on away-from-home food. These findings suggest that families with higher levels of maternal employment substitute money for time in household food production, switching from relatively time-intensive food prepared at home to relatively goods-intensive food purchased away from home. I now estimate the association between maternal employment and the quality of nutrition, as measured by the HEI and the densities, per 1,000 calories, of 11 different nutrients, as well as the association between maternal employment and obesity.

The individual nutrient equations (9) can be estimated for each nutrient using the following linear regression equation:

$$log(Z_{ki}) = \alpha_0 + \alpha_{1k} PT_i + \alpha_{2k} FT_i + X_i \beta_k + \epsilon_{ki}, \quad k = 1, \ldots, K \tag{19}$$

However, focusing on the HEI as a comprehensive nutrition measure, I estimate a similar equation with the HEI as the dependent variable:

$$HEI_i = \alpha_0 + \alpha_1 PT_i + \alpha_2 FT_i + X_i \beta + \epsilon_i \tag{20}$$

In the estimation of equations (19) and (20), Z_{ki} and HEI_i are for a specific family member (a CSFII sample person), while maternal employment indicators, income, and most other independent variables are household level variables. I estimate the obesity risk equation (10) using the following logit model:[17]

$$P(Obese_i) = logit[\alpha_0 + \alpha_1 PT_i + \alpha_2 FT_i + X_i \beta + \epsilon_i] \tag{21}$$

As before, PT_i and FT_i indicate the level of maternal employment in household i, and X includes all the demographic variables included in Table 7, as well as log household income and age controls. In the HEI equation, X includes also indicator variables for the day of the week each

[17] Estimation using a linear probability model or a probit model produces similar results.

24-hour food diary was taken on. In Equation (20), α_1 is the difference in HEI points between a member of a family where the mother works part-time and a member of a family where the mother does not work, conditional on X, α_2 is the equivalent of α_1 for members of families where the mother works full-time, and the coefficient on log income gives us the effect of doubling income on the HEI, keeping maternal employment fixed. I estimate these coefficients using OLS. In the obesity regression I use the same independent variables, excluding day-of-the-week controls, and present average marginal effects for PT, FT, and log income. In both cases, I take into account the complex survey design of the CSFII when calculating standard errors. The results for members of married-couples, from both the HEI and obesity estimations, are presented in Table 8, and the results for members of single-mother families are presented in Table 9. To account for the possibility of different effects of maternal employment for different family members, I estimate the HEI and obesity equations separately for the 6 different sex-age groups.

In married-couple families, for all sex-age groups, the point estimates show that the HEI score is lower by 1 to 3 points if the mother works part-time or full-time, as compared to when she is not employed. For example, male teens with mothers who work part-time have an HEI which is lower, on average, by 1.8 points (not statistically significant at the 10 percent level) than that of their peers with mothers who do not work, while the difference is 2.9 points (statistically significant at the 5 percent level) if the mother works full-time. Fathers whose spouse works part-time have an HEI which is lower by 1.9 points, on average, than that of a father whose spouse does not work. This difference is 2.7 HEI points for fathers married to mothers who work full-time. Moreover, there is a negative association between the mother's employment and the quality of her own diet, with the HEI of full-time mothers being 1.7 points lower than that of stay-at-home mothers (all these estimated coefficients are statistically significant at the 5 percent level). The estimated log income coefficient in the HEI equation, when taking into account the maternal employment level, is positive, between 1.5 to 3 HEI points for all sex-age groups apart from male and female teenagers, for which the coefficient sign is negative but not statistically significant. These results suggest that income, while having a positive effect on the diet quality of younger children and of parents, does not have much effect on the diet quality of teenagers. This finding could be due to a larger level of independence that teenagers experience, pertaining also to food choice, whose effects may be mitigated more by maternal supervision than by higher household income.

In the estimation of the separate nutrient equations, I generally find a positive association between maternal employment in married-couple families and the densities of fat and saturated fat, along with a negative association between maternal employment and the densities of calcium, vitamin A, vitamin B6, iron, fiber, folate, and riboflavin. The coefficients for log income in these cases usually have the opposite sign to that of maternal employment. In general, the sign and magnitude of these coefficients are less consistent for both male and female teenagers, as compared to younger children and parents.[18]

In married-couple families, my results indicate a mostly positive relationship between maternal employment and the probability of being obese (lower panel of Table 8). Apart from male and female teenagers, in all sex-age groups maternal employment is associated with a higher probability of being obese. The estimated differences in the probability of being obese in these sex-age groups between members of families where the mother does not work and families where the mother works full-time are between .4 percentage points for young boys and 6.7 percentage points for young girls. The estimated association between income and obesity in married-couple families is always negative, with the largest estimated income elasticity being -.08 for mothers, so that a doubling of family income is associated with an 8 percentage points decrease in a mother's probability of being obese, all other things equal.

In single-mother families, my results do not indicate any consistent relationship between maternal employment and the HEI. They do, however, suggest a positive association between income and the HEI, with a log income coefficient of 1.5 to 3.1 (statistically significant only for mothers). As for the association between maternal employment and obesity in single-mother families, it appears that this association is mostly negative, albeit not precisely estimated.

4.4 Away-From-Home Food, Quality of Food Intake, and Obesity

Finally, I study the food choice mechanism linking maternal employment and diet quality by estimating the underlying relationship between food choices, nutrition, and obesity. If substituting money for time in household food production has negative effects on nutrition, and if this substitution is picked up by the away-share variable, we should find that AS is negatively associated with the quality of food intake. I estimate the relationship between AS and the HEI using the following

[18] Tables 14 and 15 in the web appendix.

linear regression equation:

$$HEI_i = \alpha_0 + \alpha_1(100AS_i) + X_i\beta + \epsilon_i \tag{22}$$

For convenience, I multiply AS by 100 to get percentage points as the independent variable. I also estimate the association between the away-share and obesity using a logit model with the same RHS variables:[19]

$$P(Obese_i) = logit[\alpha_0 + \alpha_1(100AS_i) + X_i\beta + \epsilon_i] \tag{23}$$

There are two potential biases in the estimation of equation (23). Since the away-share variable is an approximation, it is likely to measure with error the true allocation of food production between food prepared at home and away-from-home food. This measurement error will bias the estimated away-share coefficients towards zero. On the other hand, it is also likely that some of the correlation between the away-share and the HEI is due to selection, since people who enjoy unhealthy fast food are more likely to spend a larger proportion of their food expenditure on away-from-home food. This will bias the estimated away-share coefficients in the opposite direction. In addition, part of the correlation between the away-share and obesity could be spurious, if people who enjoy unhealthy fast food are also less likely to engage in physical activity. For lack of suitable instruments for the away-share in the CSFII, I do not address these issues here. However, the potential bias in the estimates is likely to be mitigated by the fact that the two different biases are in opposite directions.

Again, X in these regressions includes all the demographic variables included in Table 7, as well as log household income and, for the HEI equation, indicator variables for the day of the week each 24-hour food diary was taken on. This time, α_1 is the difference in HEI points when the share of food expenditure spent on away-from-home food is increased by one percentage point. An estimate of the coefficient on log income gives us the effect of doubling income on the HEI, keeping the away-share fixed, and possibly improving the quality of groceries used in food preparation at home as well as of away-from-home food. As before, I separately analyze married-couple families and single-mother families and divide each subsample into the same six sex-age groups. The results for members of married-couples are presented in Table 10 and the results for members of single-mother

[19] Estimation using a linear probability model or a probit model produces similar results.

families are presented in Table 11.[20]

In married-couple families, for all sex-age groups apart from young girls, the estimated coefficient on α_1 in the HEI regression is negative and, for fathers, and mothers, this coefficient is statistically significant at the 1 percent level. For both mothers and fathers, the estimated away-share coefficient is about -.09, so that a percentage point increase in the share of away-from-home food expenditure is associated with a .09 point reduction in the HEI score. The coefficient on log income is around 2 HEI points for all groups apart from male and female teenagers, where the income effect is not significantly different from zero, reinforcing the suggestion that a higher household income is not associated with healthier diets for teenagers.

My results also indicate a positive relationship, although not always statistically significant, between the share of food expenditure spent on away-from-home foods and obesity prevalence in all subgroups apart from teenagers. In these cases, the average marginal effect is estimated to be between .1 percentage points and .2 percentage points (statistically significant only for fathers). According to these point estimates, and not for teenagers, a percentage point increase in the away-share is associated with an increase of up to .2 of a percentage point in the probability of married-couple family members being obese. The association between income and obesity, on the other hand, is estimated to be negative for all groups, and statistically significant at the 5 percent level for mothers. The estimated effect of log income on obesity for mothers ages 21 to 55 is $-.068$, so that doubling household income, without changing the away-share, is associated with a 6.8 percentage point decrease in their probability of being obese.

In the case of single-mother families, the association between the away-share and the HEI is again negative for all sex-age groups apart from young girls, between -.07 to -.14, although never statistically different from zero. The estimated effect of income on the HEI is positive for all sex-age groups, and again stronger than for married-couple families, with the largest coefficients this time estimated for teenagers at just above 3 HEI points for teenage males and about 3.5 HEI points for teenage females. As for obesity results in single-mother families, both the away-share coefficients and the income coefficients are not precisely estimated. Still, the estimated income effects are negative for all subgroups, and relatively large for young boys.

[20] Results using nutrient densities are presented in Tables 16 and 17 in the web appendix.

5 Conclusion

In this paper, I offer a theoretical framework conceptualizing the tradeoff between time and money in household food production and the implications for the nutrition of family members. I then use two nationally representative samples, one measuring time-use (ATUS 2003-2005) and the other measuring food-intake (CSFII 1994-1996) to test the implications of my model.

I separately study married-couple families and single-mother families. At the household level, my results suggest that maternal employment is associated with a substitution of money for time in household food production in both family types: Time spent on food preparation falls with maternal employment, while the share of food expenditure spent on away-from-home food rises with maternal employment. Furthermore, these results are not due to observable differences between households with different levels of maternal employment.

The substitution of money for time is achieved by obtaining a larger portion of household food from fast-food, carry-out, and other restaurants, which is relatively less healthy than more time-intensive food prepared at home. As a result, higher levels of maternal employment are expected to be associated with lower qualities of food intake of family members. In married-couple families, I indeed find a negative association between maternal employment and the quality of food-intake of family members, as measured by the Healthy Eating Index (HEI) and the densities (per 1,000 Kcal) of important nutrients. This association is consistent across all sex-age groups. In these families, I also find a positive association between maternal full-time employment and adult and childhood obesity, albeit not in all sex-age groups. However, I do not find these associations in single-mother families, indicating that in these families other factors may have a more substantial effect on the quality of the food consumed.

My results also suggest two interesting phenomena in the case of married-couple families. Firstly, the negative association between maternal employment and the Health Eating Index is relatively consistent across sex-age groups - there are no substantial differences between children and parents and between males and females. However, the decrease in dietary quality could be relatively more of a concern in the case of younger children. Secondly, while household income, as expected, is positively associated with the quality of food intake for young children and for parents, this is not the case for teenagers of both sexes. This result could be due to a larger level of independence

that teenagers experience and that pertains also to food choices. This sort of independence may be mitigated more by maternal supervision than by higher household income.

While I do find a positive association between maternal employment and obesity for some sex-age groups in married-couple families, the magnitude of this association is relatively small and can explain very little of the time trend increase in obesity. Furthermore, food choices are clearly not the only mechanism creating this link. As others have suggested, increased maternal employment is also associated with children spending more time watching television and less time in sports activities, which means lower levels of energy expenditure. I have not studied TV watching and physical activities in this paper, but my (limited) analysis of energy intakes does not find statistically significant differences by levels of maternal employment. This result suggests that there is further need to investigate to what degree do differences in energy intake explain differences in obesity rates, as compared to differences in energy expenditure.

My paper has several important policy implications. First of all, in the measurement of poverty status and other indicators of well-being, it is important to take into account non-monetary variables, such as the availability of non-market time. All other things equal, my results suggest that dietary quality will be higher for members of a family of two parents and two children where the mother does not work, than in a family where the mother works full-time. Moreover, the quality of food intake is unlikely to be the only measure of well-being that is associated with maternal employment. Currently, however, official poverty measurement in the U.S. does not take into account the number of earners in a family, only household income and age composition.

My paper also highlights important differences between married-couple families and single-mother families. While in married-couple families there is a consistent negative association between maternal employment and the quality of food intake across all sex-age groups, there is no consistent pattern in single-mother families. If anything, my results show a negative relationship between maternal employment and obesity in single-mother families. This apparent difference in outcomes between the two different family types suggests that policy makers should, when appropriate, tailor different policies for different populations.

Also interesting from a policy perspective, is the finding that increased maternal employment seems to have a substantial negative effect on the quality of teenagers' diets, while increased income does not compensate in the other direction. This finding should be taken into consideration when

thinking about nutrition policy issues related to teenagers.

Finally, I do not intend to suggest that married mothers should work less in order to improve the quality of dietary intake of household members. Rather, it is important that parents as well as policy makers realize the possibly detrimental tradeoffs that take place when substituting money for time in household food production. One step in that direction is to inform the public as much as possible about the dietary quality of away-from-home foods, so that they are better informed about the (possibly unintended) consequences of their decisions regarding the allocation of time money.

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Table 1: ATUS Variable Means (Households)

	Married-Couple Families			Single-Mother Families		
	Mother does not work	Mother works part-time	Mother works full-time	Mother does not work	Mother works part-time	Mother works full-time
Mother Weekly Work Hrs	0	21	42	0	24	41
Father Weekly Work Hrs	46	47	45	-	-	-
Age Mother	36	38	38	34	34	37
Age Father	38	40	40	-	-	-
Income less than $20,000	0.12	0.04	0.02	0.83	0.65	0.33
Income $20,000 to $39,999	0.25	0.17	0.15	0.11	0.25	0.40
Income $40,000 to $59,999	0.19	0.20	0.21	0.02	0.04	0.17
Income $60,000 to $74,999	0.11	0.16	0.17	0.01	0.02	0.04
Income $75,000 to $99,999	0.21	0.28	0.30	0.01	0.04	0.03
Income $100,000 and over	0.11	0.15	0.15	0.01	0.00	0.02
Number of Children	2.27	2.15	1.90	2.11	2.14	1.82
Number of Children Age 0-5	0.94	0.64	0.52	0.73	0.63	0.37
Number of Children Age 6-11	0.76	0.74	0.61	0.80	0.78	0.65
Number of Children Age 12-17	0.47	0.64	0.63	0.51	0.61	0.68
Have Children Over 18	0.09	0.13	0.16	0.10	0.10	0.15
Mother's Education < 12	0.14	0.05	0.05	0.30	0.18	0.93
Mother's Education $= 12$	0.28	0.22	0.26	0.39	0.30	0.36
Mother's Education > 12	0.57	0.73	0.68	0.41	0.52	0.55
Black, Non-Hispanic	0.05	0.04	0.10	0.40	0.35	0.32
Hispanic	0.24	0.09	0.13	0.19	0.14	0.15
Northeast	0.16	0.23	0.17	0.23	0.22	018
Midwest	0.22	0.27	0.28	0.21	0.27	025
South	0.34	0.26	0.35	0.37	0.36	041
West	0.28	0.23	0.20	0.19	0.16	016
2003	0.33	0.34	0.32	0.28	0.33	0.31
2004	0.34	0.33	0.35	0.34	0.32	0.35
2005	0.33	0.33	0.33	0.38	0.35	0.34
Mother sampled	0.51	0.53	0.52	1.00	1.00	1.00
Mother Food-Time	123	91	73	96	60	59
Weekday	0.49	0.50	0.49	0.47	0.45	0.50
Weekend	0.51	0.50	0.51	0.53	0.55	0.50
Holiday	0.02	0.02	0.02	0.02	0.02	0.03
Father Sampled	0.49	0.47	0.48			
Father Food-Time	26	28	31			
Weekday	0.49	0.52	0.49			
Weekend	0.51	0.48	0.51			
Holiday	0.02	0.03	0.02			
Number of Households	3278	2026	4334	526	280	1368
Percent of Households	34	20	46	26	12	62

Notes: Source is ATUS 2003-2005. Sample is limited to families where parents are ages 21 to 55, there is at least one child under 18, and fathers work full-time. Mother works full-time if usual weekly hours of work is greater then 35. Food-Time is minutes per day spent on shopping for or preparing food. Means are weighted.

Table 2: CSFII Variable Means (Households)

	Married-Couple Families			Single-Mother Families		
	Mother does not work	Mother works part-time	Mother works full-time	Mother does not work	Mother works part-time	Mother works full-time
Mother Weekly Work Hrs	0	21	43	0	23	43
Father Weekly Work Hrs	49	48	48	-	-	-
Age Mother	35	36	36	34	36	37
Age Father	37	39	39	-	-	-
Annual Income ($1,000's)	45	52	56	10	16	26
Monthly Exp at Grocery Stores	454	462	442	319	377	314
Monthly Exp on Away-Food	137	161	188	56	75	125
Away-Share	0.22	0.25	0.28	0.14	0.16	0.28
Number of Children	2.27	2.17	1.93	2.19	2.25	1.75
Number of Children Age 0-5	0.96	0.67	0.56	0.76	0.55	0.39
Number of Children Age 6-11	0.74	0.81	0.64	0.74	0.68	0.62
Number of Children Age 12-17	0.47	0.58	0.61	0.57	0.92	0.63
Have Children Over 18	0.08	0.08	0.11	0.08	0.08	0.10
Mother's Education < 12	0.15	0.06	0.07	0.29	0.19	0.10
Mother's Education $= 12$	0.33	0.29	0.33	0.37	0.32	0.42
Mother's Education > 12	0.52	0.65	0.60	0.34	0.49	0.48
Black, Non-Hispanic	0.03	0.06	0.09	0.40	0.31	0.27
Hispanic	0.13	0.08	0.09	0.17	0.11	0.14
Rural	0.18	0.16	0.24	0.14	0.18	0.19
Northeast	0.18	0.22	0.15	0.30	0.17	0.19
Midwest	0.21	0.29	0.26	0.22	0.37	0.22
South	0.37	0.27	0.40	0.24	0.28	0.43
West	0.24	0.22	0.19	0.24	0.18	0.16
1994	0.41	0.48	0.41	0.45	0.38	0.40
1995	0.31	0.26	0.30	0.27	0.33	0.31
1996	0.28	0.26	0.29	0.28	0.29	0.29
Income Imputed	0.21	0.14	0.16	0.15	0.14	0.15
Income Topcoded	0.09	0.10	0.07	0.00	0.00	0.00
Number of Households	728	461	932	177	60	234
Percent of Households	31	23	46	32	12	56

Notes: Source is CSFII 1994-1996. Sample is limited to families where parents are ages 21 to 55, there is at least one child under 18, and fathers work full-time. Mother works full-time if usual weekly hours of work is greater then 35. Away-Share is share of food expenditure spent on food prepared away-from-home. Means are weighted to account for complex survey design.

Table 3: Mean HEI scores and Obesity Prevalence in Married-Couple Families (Sample Persons)

	Males			Females		
	6-11	12-17	21-55	6-11	12-17	21-55
HEI						
Mother does not work	69.56(8.85)	65.43(8.33)	63.42(9.27)	69.31(9.59)	66.20(7.99)	65.16(8.52)
Mother works part-time	66.98(9.84)*	64.53(8.12)	61.98(9.27)	67.46(10.1)	62.73(9.07)*	64.78(9.37)
Mother works full-time	66.99(9.01)*	61.93(8.59)**	60.78(7.82)***	66.12(9.02)**	61.87(8.31)***	62.89(8.66)***
N	435	318	952	437	303	821
Obese						
Mother does not work	0.17(0.36)	0.08(0.25)	0.15(0.33)	0.12(0.34)	0.11(0.28)	0.14(0.28)
Mother works part-time	0.17(0.39)	0.03(0.16)	0.16(0.32)	0.13(0.36)	0.05(0.20)	0.11(0.26)
Mother works full-time	0.16(0.37)	0.17(0.35)*	0.23(0.36)***	0.15(0.37)	0.06(0.21)	0.21(0.34)**
N	395	312	941	396	296	788

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Source is CSFII 1994-1996. Sample is limited to families where parents are ages 21 to 55, there is at least one child under 18, and fathers work full-time. Mother works full-time if usual weekly hours of work is greater then 35. The HEI is averaged over 2 intake days. Means are weighted. Standard deviations in parentheses account for the complex survey design. Significance levels are for t-tests of difference from same sex-age group in families where the mother does not work.

Table 4: Mean HEI scores and Obesity Prevalence in Single-Mother Families (Sample Persons)

	Males		Females		
	6-11	12-17	6-11	12-17	21-55
HEI					
Mother does not work	65.15(9.58)	60.51(8.95)	63.35(9.30)	59.12(8.91)	58.48(11.5)
Mother works part-time	62.66(8.38)	62.20(8.57)	63.09(13.2)	65.85(8.80)	62.10(9.91)*
Mother works full-time	64.82(9.09)	60.38(7.89)	66.90(7.68)	62.57(9.69)	60.88(8.57)
N	106	84	100	94	267
Obese					
Mother does not work	0.40(0.55)	0.40(0.43)	0.24(0.429)	0.16(0.34)	0.35(0.47)
Mother works part-time	0.10(0.33)**	0.27(0.41)	0.46(0.564)	0.04(0.18)	0.13(0.33)***
Mother works full-time	0.25(0.44)	0.19(0.35)*	0.34(0.458)	0.08(0.25)	0.18(0.33)**
N	96	80	86	89	259

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Source is CSFII 1994-1996. Households limited to single mothers ages 21 to 55 with at least one child under 18. Mother works full-time if usual weekly hours of work is greater then 35. The HEI is averaged over 2 intake days. Means are weighted. Standard deviations in parentheses account for the complex survey design. Significance levels are for t-tests of difference from same sex-age group in families where the mother does not work.

Table 5: Maternal Employment and Mothers' Time in Food Preparation

	Married-Couple Families			Single-Mother Families		
	(1)	(2)	(3)	(1)	(2)	(3)
Mother works part-time (PT)	-31.5(5.06)***	-27.0(4.97)***	-25.1(5.01)***	-36.4(7.23)***	-35.8(7.01)***	-34.6(7.69)***
Mother works full-time (FT)	-50.0(3.93)***	-42.8(3.97)***	-38.8(4.15)***	-37.2(6.50)***	-32.2(7.37)***	-29.6(8.80)***
Age Mother		-0.1(2.40)	-0.1(2.47)		-0.9(2.69)	-1.7(2.91)
Age Mother Squared		0.0(.031)	0.0(.031)		0.0(0.04)	0.0(0.04)
Number of Children		9.6(2.31)***	9.8(2.38)***		11.1(5.17)**	11.0(5.75)*
Number of Child Age 0-5		3.3(2.62)	3.3(2.77)		1.4(5.19)	0.6(5.46)
Number of Child Age 12-17		3.2(3.01)	3.0(3.02)		-6.3(3.63)*	-5.4(3.76)
Have Child Over 18		-1.6(5.79)	-1.1(5.83)		-7.4(7.52)	-9.6(8.02)
Mother's education = 12		-31.8(9.83)***	-29.4(10.1)***		4.7(8.37)	4.0(9.48)
Mother's education > 12		-32.6(9.65)***	-23.5(10.0)**		-4.5(7.08)	-5.8(8.15)
Black, Non-Hispanic		-3.3(7.25)	1.8(7.24)		6.3(5.86)	6.5(6.42)
Hispanic		21.8(6.35)***	22.1(6.79)***		15.1(6.89)**	13.5(7.45)*
Income $20,000 to $39,999			-6.8(10.1)			-5.9(6.03)
Income $40,000 to $59,999			-14.0(10.4)			-4.8(9.39)
Income $60,000 to $74,499			-13.8(10.5)			-4.8(10.8)
Income $75,000 to $99,999			-20.3(10.4)**			13.6(11.7)
Income $100,000 and over			-17.4(10.7)*			-28.6(11.0)***
R^2	0.051	0.097	0.100	0.039	0.093	0.097
N	5023	5023	4565	2174	2174	1950

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Source is ATUS 2003-2005. Dependent variable is minutes per day spent on food and drink preparation, grocery shopping, and related travel. Sample is limited to families where parents are ages 21 to 55, there is at least one child under 18, and fathers work full-time. Mother works full-time if usual weekly hours of work is greater then 35. Regressions (2) and (3) included also controls for region, year, and day of week. Standard errors in parentheses.

Table 6: Maternal Employment and Fathers' Time in Food Preparation

	Married-Couple Families		
	(1)	(2)	(3)
Mother works part-time (PT)	1.6(2.65)	3.5(2.67)	4.3(2.78)
Mother works full-time (FT)	4.5(2.18)**	5.9(2.30)***	7.4(2.46)***
Age Father		-.9(1.57)	-0.9(1.68)
Age Father Squared		0.0(.02)	0.0(0.02)
Number of Children		-1.5(1.26)	-1.2(1.34)
Number of Child Age 0-5		5.8(1.60)***	5.7(1.72)***
Number of Child Age 12-17		1.5(1.71)	1.5(1.83)
Have Child Over 18		-3.8(3.10)	-4.4(3.35)
Mother's education = 12		-11.1(6.06)*	-10.0(6.67)
Mother's education > 12		-9.6(5.89)*	-8.3(6.66)
Black, Non-Hispanic		4.4(4.67)	6.0(5.15)
Hispanic		0.9(3.70)	1.8(3.86)
Income $20,000 to $39,999			-5.1(7.62)
Income $40,000 to $59,999			-5.1(7.27)
Income $60,000 to $74,499			-8.7(7.41)
Income $75,000 to $99,999			-3.8(7.15)
Income $100,000 and over			-7.4(7.36)
R^2	0.001	0.040	0.043
N	4615	4614	4202

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Source is ATUS 2003-2005. Dependent variable is minutes per day spent on food and drink preparation, grocery shopping, and related travel. Sample is limited to families where parents are ages 21 to 55, there is at least one child under 18, and fathers work full-time. Mother works full-time if usual weekly hours of work is greater then 35. Regressions (2) and (3) included also controls for region, year, and day of week. Standard errors in parentheses.

Table 7: Maternal Employment and the Share of Food Expenditure Spent on Away-From-Home Food

	Married-Couple Families			Single-Mother Families		
	(1)	(2)	(3)	(1)	(2)	(3)
Mother works part-time	0.029(0.009)***	0.023(0.008)***	0.019(0.008)**	0.020(0.016)	0.008(0.015)	-0.005(0.016)
Mother works full-time	0.068(0.006)***	0.049(0.006)***	0.040(0.006)***	0.143(0.013)***	0.118(0.014)***	0.074(0.021)***
Number of Children		-0.025(0.005)***	-0.024(0.005)***		-0.021(0.013)	-0.026(0.014)*
Number of Child Age 0-5		-0.014(0.006)**	-0.015(0.006)***		-0.012(0.017)	-0.011(0.016)
Number of Child Age 12-17		0.012(0.006)**	0.012(0.005)**		0.003(0.016)	-0.006(0.016)
Have Child Over 18		0.007(0.013)	0.008(0.012)		0.044(0.033)	0.039(0.038)
Mother's education = 12		0.016(0.014)	-0.003(0.015)		-0.021(0.021)	-0.036(0.019)*
Mother's education > 12		0.028(0.013)**	-0.006(0.015)		0.030(0.025)	-0.008(0.025)
Black, Non-Hispanic		-0.023(0.016)	-0.011(0.015)		-0.006(0.020)	0.005(0.019)
Hispanic		-0.006(0.011)	0.009(0.011)		-0.039(0.018)**	-0.022(0.020)
Rural		-0.015(0.012)	-0.003(0.012)		-0.040(0.016)**	-0.032(0.017)*
Log Income			0.046(0.008)***			0.046(0.011)*
R^2	0.046	0.115	0.146	0.164	0.244	0.274
N	2120	2120	2116	469	469	467

Significance levels : $*$: 10% $**$: 5% $***$: 1%

Notes: Source is CSFII 1994-1996. Dependent variable is share of food expenditure spent on food prepared away-from-home. Sample is limited to families where parents are ages 21 to 55, there is at least one child under 18, and fathers work full-time. Mother works full-time if usual weekly hours of work is greater then 35. Regressions (2) and (3) include also age and age squared for parents and controls for region and year. Regression (3) also includes indicator variables for topcoded and imputed incomes. Standard errors in parentheses account for the complex survey design.

Table 8: Maternal Employment, HEI and Obesity in Married-Couple Families

	Males			Females		
	6-11	**12-17**	**21-55**	**6-11**	**12-17**	**21-55**
HEI						
Mother Works Part-Time	-2.497(0.945)***	-1.813(1.652)	-1.903(0.949)**	-1.966(1.279)	-3.014(1.392)**	-0.960(0.967)
Mother Works Full-Time	-1.374(1.174)	-2.864(1.380)**	-2.714(0.870)***	-2.315(1.210)*	-2.813(1.249)**	-1.731(0.808)**
Log Income	1.603(1.264)	-0.600(1.681)	1.545(0.774)**	2.967(1.130)**	-0.329(1.647)	1.888(0.785)**
R^2	0.236	0.250	0.150	0.234	0.277	0.154
N	434	318	950	437	302	819
Obese						
Mother Works Part-Time	0.038(0.050)	-0.082(0.054)	0.007(0.031)	0.104(0.056)*	-0.037(0.023)*	-0.025(0.028)
Mother Works Full-Time	0.004(0.061)	0.051(0.058)	0.052(0.021)**	0.067(0.053)	-0.041(0.030)	0.055(0.026)**
Log Income	-0.030(0.042)	-0.016(0.039)	-0.001(0.031)	-0.037(0.050)	-0.028(0.020)	-0.080(0.027)***
R^2	-	-	-	-	-	-
N	394	312	939	396	295	786

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Source is CSFII 1994-1996. Sample is limited to families where parents are ages 21 to 55, there is at least one child under 18, and fathers work full-time. Mother works full-time if usual weekly hours of work is greater then 35. The HEI is averaged over the 2 intake days. Upper panel of estimated coefficients is from an OLS regression and lower panel is average marginal effects from a logit regression. All regressions include the demographic controls used in Table 7. Regressions for 6-11 and 12-17 age groups also include age dummies. Standard errors in parentheses account for the complex survey design.

Table 9: Maternal Employment, HEI and Obesity in Single-Mother Families

	Males		Females		
	6-11	**12-17**	**6-11**	**12-17**	**21-55**
HEI					
Mother Works Part-Time	-2.885(3.058)	5.330(3.193)*	-1.081(2.963)	1.218(2.877)	1.213(1.596)
Mother Works Full-Time	-0.402(2.469)	-1.009(2.541)	0.798(2.915)	-0.663(2.983)	-0.371(1.490)
Log Income	1.461(1.184)	3.122(2.170)	2.122(1.582)	2.725(1.852)	1.712(0.859)**
R^2	0.397	0.466	0.469	0.443	0.291
N	106	84	100	94	265
Obese					
Mother Works Part-Time	-0.174(0.075)**	-0.344(0.216)	0.014(0.069)	-0.305(0.001)***	-0.128(0.054)**
Mother Works Full-Time	0.050(0.104)	-0.324(0.089)***	-0.345(0.081)***	-0.361(0.011)***	-0.073(0.059)
Log Income	-0.076(0.068)	-0.009(0.076)	0.093(0.059)	0.204(0.017)***	-0.010(0.024)
R^2	-	-	-	-	-
N	96	80	86	89	257

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Source is CSFII 1994-1996. Households limited to single mothers ages 21 to 55 with at least one child under 18. Mother works full-time if usual weekly hours of work is greater then 35. The HEI is averaged over the 2 intake days. Upper panel of estimated coefficients is from an OLS regression and lower panel is average marginal effects from a logit regression. All regressions include the demographic controls used in Table 7. Regressions for 6-11 and 12-17 age groups also include age dummies. Standard errors in parentheses account for the complex survey design.

Table 10: Away-Share, HEI and Obesity in Married-Couple Families

	Males			**Females**		
	6-11	**12-17**	**21-55**	**6-11**	**12-17**	**21-55**
HEI						
Away-Share (%)	-0.015(0.041)	-0.067(0.043)	-0.086(0.031)***	0.025(0.041)	-0.052(0.037)	-0.091(0.034)***
Log Income	1.692(1.348)	-1.000(1.652)	1.332(0.703)*	2.377(1.031)**	-0.913(1.629)	1.897(0.793)**
R^2	0.226	0.246	0.161	0.223	0.268	0.159
N	434	318	949	436	302	819
Obese						
Away-Share (%)	0.001(0.002)	0.000(0.001)	0.002(0.001)**	0.001(0.002)	-0.001(0.001)	0.001(0.001)
Log Income	-0.038(0.037)	-0.012(0.042)	-0.006(0.032)	-0.031(0.051)	-0.027(0.021)	-0.068(0.025)***
R^2	-	-	-	-	-	-
N	394	312	938	395	295	786

Significance levels : * : 10% ** : 5% *** : 1%

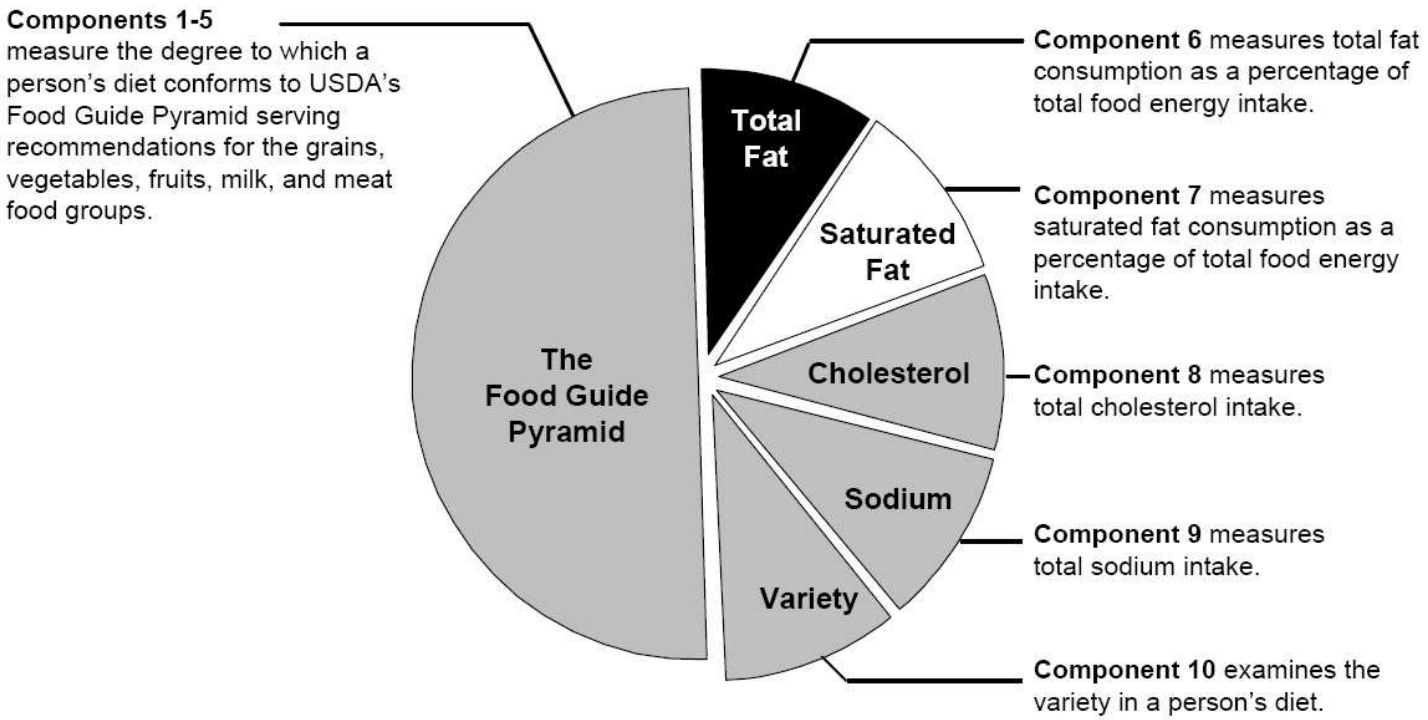
Notes: Source is CSFII 1994-1996. Sample is limited to families where parents are ages 21 to 55, there is at least one child under 18, and fathers work full-time. Away-Share is share of food expenditure spent on food prepared away-from-home in the last three months. The HEI is averaged over the 2 intake days. Upper panel of estimated coefficients is from an OLS regression and lower panel is average marginal effects from a logit regression. All regressions include the demographic controls used in Table 7. Regressions for 6-11 and 12-17 age groups also include age dummies. Standard errors in parentheses account for the complex survey design.

Table 11: Away-Share, HEI and Obesity in Single-Mother Families

	Males		**Females**		
	6-11	**12-17**	**6-11**	**12-17**	**21-55**
HEI					
Away-Share (%)	-0.117(0.075)	-0.068(0.087)	0.028(0.063)	-0.144(0.099)	-0.075(0.048)
Log Income	2.037(0.921)**	3.045(2.294)	2.561(1.929)**	3.511(1.526)**	2.118(0.787)***
R^2	0.406	0.542	0.467	0.454	0.299
N	106	84	99	94	265
Obese					
Away-Share (%)	0.003(0.003)	-0.001(0.004)	-0.003(0.002)	0.001(0.001)	-0.001(0.001)
Log Income	-0.084(0.054)	-0.104(0.056)*	-0.025(0.052)	-0.056(0.007)***	-0.023(0.018)
R^2	-	-		-	-
N	96	80	85	89	257

Significance levels : * : 10% ** : 5% *** : 1%

Notes: Source is CSFII 1994-1996. Households limited to single mothers ages 21 to 55 with at least one child under 18. Away-Share is share of food expenditure spent on food prepared away-from-home in the last three months. The HEI is averaged over the 2 intake days. Upper panel of estimated coefficients is from an OLS regression and lower panel is average marginal effects from a logit regression. All regressions include the demographic controls used in Table 7. Regressions for 6-11 and 12-17 age groups also include age dummies. Standard errors in parentheses account for the complex survey design.



Source: USDA, Center for Nutrition Policy and Promotion (CNPP)

Figure 1: The 1995 Healthy Eating Index (HEI)