Chapter 3
Multivariate Analyses of Mother's Work and Children's Nutrition Outcomes

In Chapter 2, it was shown that children whose mothers work full-time tend to have less positive nutrition outcomes than children of nonworking mothers. Areas in which significant differences were seen included overall diet quality (Healthy Eating Index score); food energy intake for infants and preschool children; mean intake of iron, zinc, and dietary fiber among teenage girls; dietary fiber intake for school-age children; and consumption of soda.

It is plausible that these differences could be caused by maternal employment, because working mothers have less time to supervise their children's diets. These differences, however, could also be attributable in part to other characteristics that are correlated with maternal employment. Conversely, if other household circumstances are more favorable for children of working mothers, the bivariate differences could be **underestimates** of the effects of maternal employment.

In fact, as shown below, children of working mothers are relatively advantaged in some important ways: their households have more income, and the mothers have more education and are more knowledgeable about nutrition. On the other hand, resources available **excluding** the mother's earnings are greater among households with homemaker mothers than among those with full-time working mothers (but higher still among households with part-time working mothers). In a sense, the full-time working mothers "have to" work.

Other factors could cause nutrition outcome differences in either direction: race and ethnicity (full-time working mothers are more likely to be black, and nonworking mothers are more likely to be Hispanic), mother's age (working mothers tend to be older), region and urbanicity, and household size.

In this chapter, after documenting the other differences in household circumstances, estimates are presented of differences in selected children's nutrition outcomes controlling for these factors. The qualitative findings for this set of outcomes remain unchanged. Virtually all differences that were previously found to be statistically significant remain so after regression adjustment. A few additional differences for particular age groups attain statistical significance. This supports the hypothesis that full-time maternal employment causes the observed differences in child nutrition outcomes.

Child, Household, and Maternal Characteristics

Marked demographic and socioeconomic differences can be seen between children of working and nonworking mothers, and, to a lesser extent, between the children of mothers who work full-time *versus* part-time. Children of homemaker mothers are more likely to be preschoolers, Hispanic, poor, and from large households than children of working mothers; and homemaker mothers themselves are younger and less well educated than working mothers. Children of part-time working mothers are disproportionately non-Hispanic white, and their mothers tend to be better educated than full-time
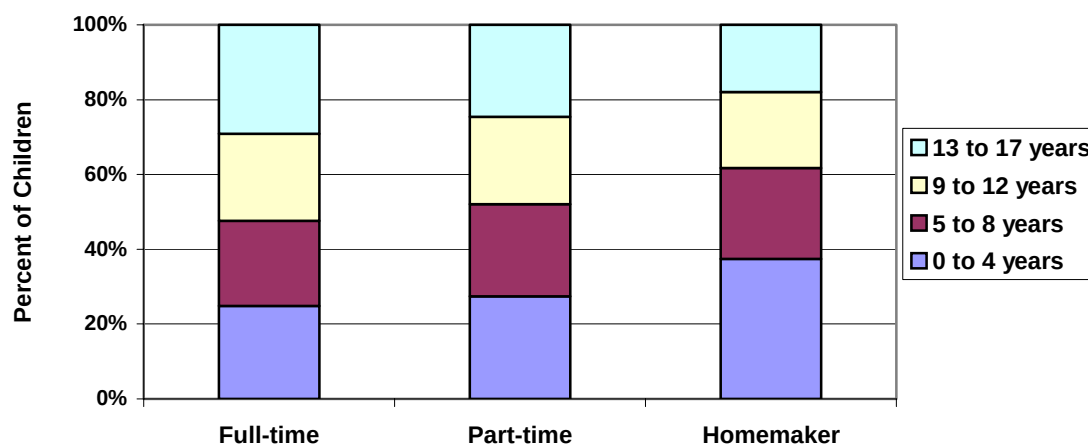
working mothers. In addition, working mothers, both full- and part-time, are more knowledgeable about nutrition than homemakers, although nutrition attitudes are similar across the three groups.

Characteristics of Sample Children

The CSFII sample children range in age from infancy to 17 years. Younger children are naturally concentrated among nonworking mothers, reflecting considerations of child development and need for child care. Nearly two fifths of children of nonworking mothers are under age five, *versus* only a quarter of children of working mothers (Exhibit 3.1). (Note that all analyses presented in this report are age-adjusted.)
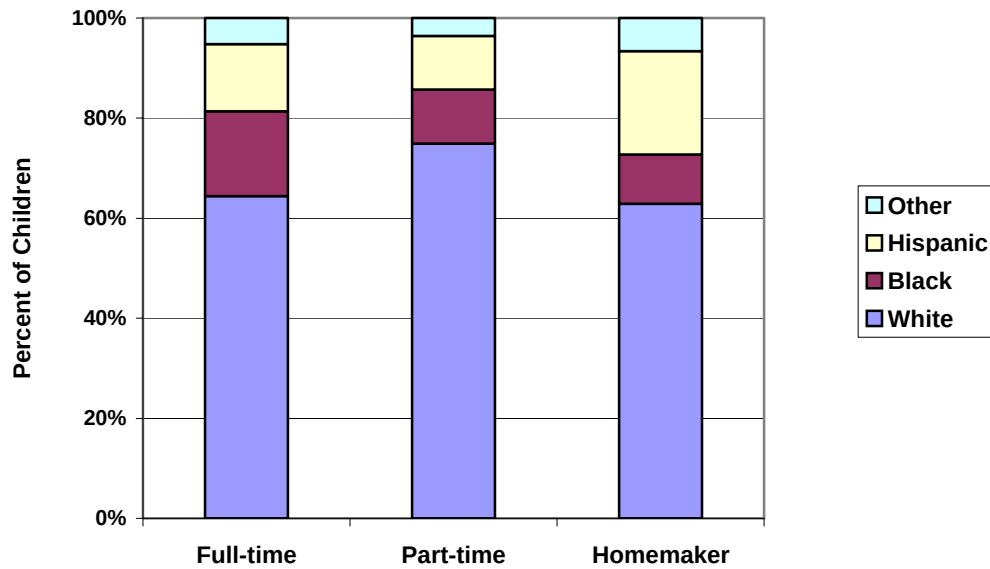
Exhibit 3.1

Age of Children, by Maternal Employment Status


Racial/ethnic background also varies markedly across the three groups. Three quarters of children whose mothers work part-time are white, in contrast to fewer than two thirds in the other two groups (Exhibit 3.2). Hispanic children are heavily concentrated among nonworking mothers, whereas black children are especially likely to have full-time working mothers.
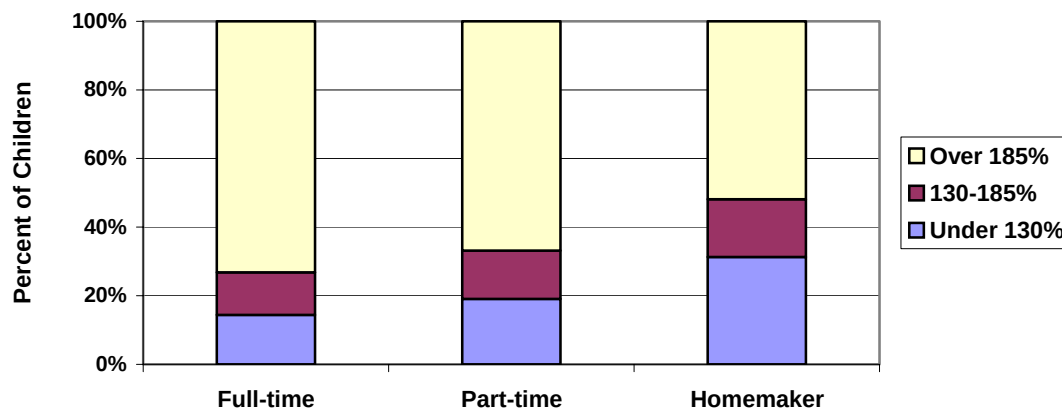
Exhibit 3.2

Race/Ethnicity of Children, by Maternal Employment Status

Characteristics of Households

Households with homemaker mothers are somewhat larger on average than households with full-time or part-time working mothers. Although the number of adults is the same on average (2.1), households with homemaker mothers tend to include more children (2.2 *versus* 1.8 to 2.0). They are also substantially poorer (Exhibit 3.3) and more likely to be receiving public assistance (14 percent *versus* 2 to 4 percent). Barely half of households with homemaker mothers have incomes over 185 percent of the federal poverty level, compared with two thirds to three quarters of households with mothers who work part-time and full-time (52 percent *versus* 67 and 73 percent).
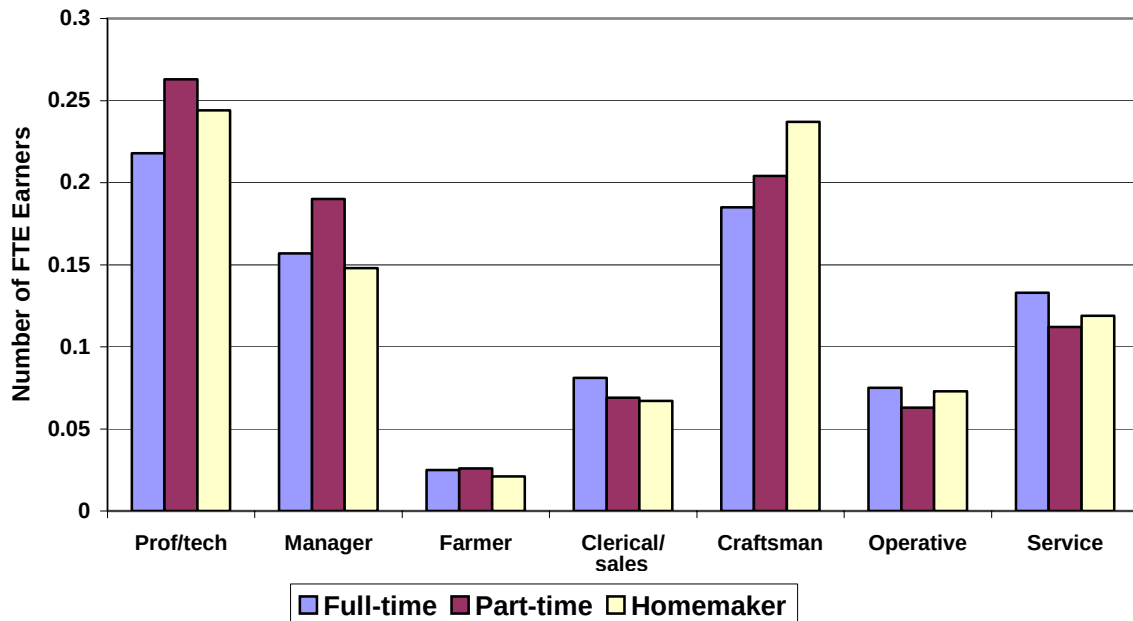
Exhibit 3.3

Household Income as Percent of Poverty, by Maternal Employment Status

This analysis of relative household income may be seriously misleading, however, with regard to the resources and choices available to mothers. The higher income of households with full-time working mothers is in fact explained by those mothers' very decision to work. To understand the relative well-being of these groups of households, we need to consider how well off they would be based on other household income if none of the mothers chose to work. Although it is not possible to determine this exactly based on available data, an approximate answer can be obtained by examining the occupations and hours worked by other adults in these households. It may reasonably be assumed that a mother's decision to work is generally an effect rather than a cause of the employment and earnings of other household members (e.g., her husband).

It appears that mothers who work part-time are initially better off than homemaker mothers, and that mother who work full-time are initially worse off. The mean number of full-time equivalent workers other than the mother herself is 0.90 for homemaker mothers, *versus* 0.93 for part-time working mothers and 0.87 for full-time working mothers. Furthermore, part-time working mothers are more likely to have an earner in the household who is professional/technical or managerial, whereas full-time working mothers are more likely to have an earner who is a clerical, sales, or service worker (Exhibit 3.4).

Exhibit 3.4

FTE Earners in Mothers' Households, by Occupation and Maternal Employment Status
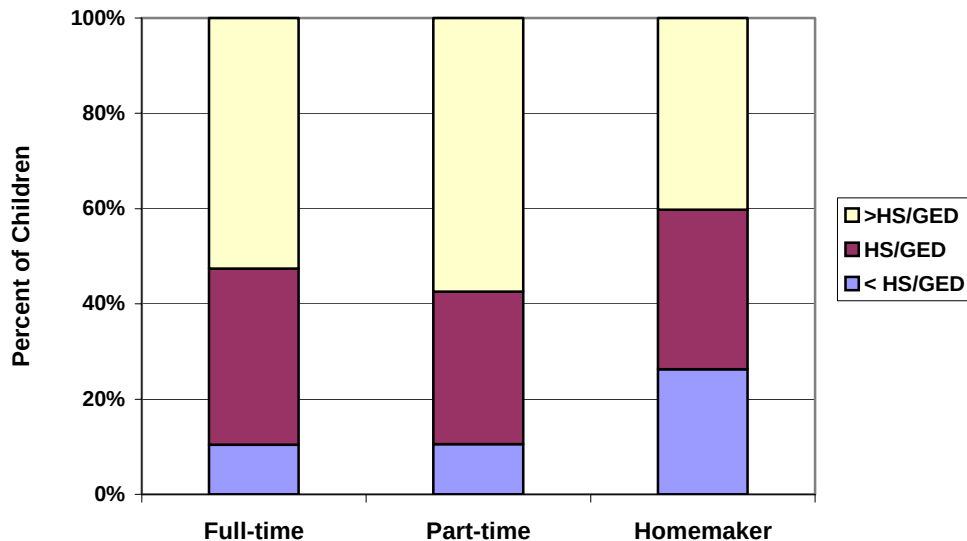
FTE = Full Time Equivalent

This information can be used to construct a crude index of "other earnings" in households. The numbers of full-time equivalent workers in each occupation, male and female, are multiplied by the average weekly earnings of men and women in those occupations in 1996, based on the CPS. The value of this index is $587 for homemakers, *versus* $558 for full-time and $626 for part-time working mothers—i.e., 7 percent higher for part-time working mothers than for homemakers, and 5 percent lower for full-time working mothers than for homemakers. The occupational distribution of other adults in mothers' households thus strengthens the pattern seen with regard simply to the presence and number of other earners.

Demographic Characteristics of Mothers

A quarter of homemaker mothers are under age 30, compared with less than a fifth of working mothers (25 percent *versus* 19 percent). Homemaker mothers have substantially less education than full-time, and especially part-time, working mothers (Exhibit 3.5).

Exhibit 3.5

Mothers' Education, by Employment Status
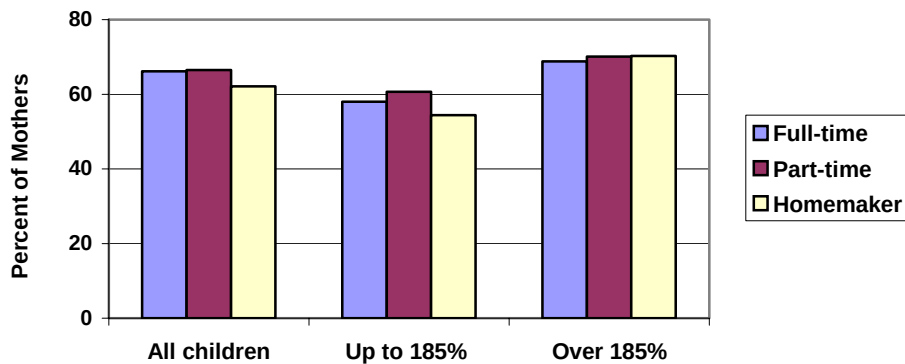
Maternal Nutrition Knowledge and Attitudes

The extent to which working mothers differ from nonworking mothers in their nutrition knowledge, and awareness of and attitudes towards dietary recommendations and diet-disease relationships, may also help to explain differences in child outcomes. A subset of mothers who responded to CSFII was queried about their nutrition knowledge and attitudes in the DHKS. Their responses were summarized into two indices.

Nutrition knowledge is represented as a respondent's score (percent correct) across three batteries of items: a group of five items pertaining to recommended numbers of servings from the main Food Guide Pyramid food groups; a group of four items pertaining to practical knowledge about dietary fat, saturated fat, cholesterol, and nutrient amounts in foods; and a group of seven items pertaining to relationships between diet and disease. A score was calculated for each battery, and was then averaged over the three.
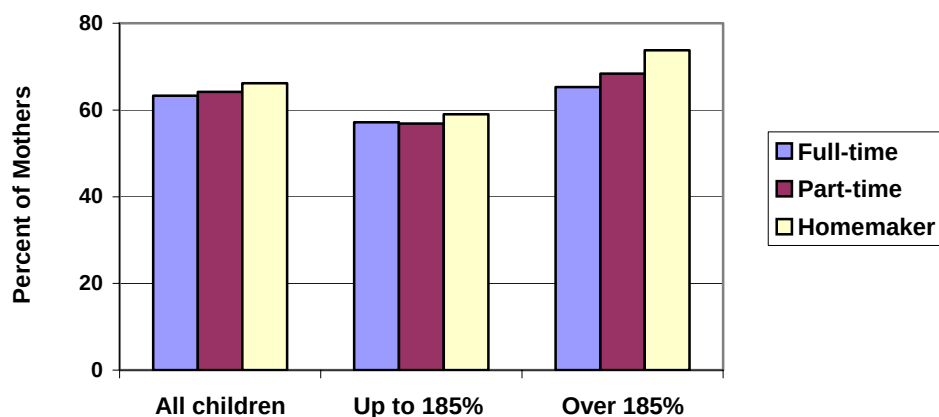
Working mothers have significantly higher nutrition knowledge scores than nonworking mothers: 66 to 67 percent *versus* 62 percent ($p < 0.05$ for both). The scores are strongly related to household income; controlling for income group, the differences by maternal employment nearly vanish (Exhibit 3.6).

Exhibit 3.6

Mothers' Nutrition Knowledge Score, by Employment Status and Household Income Relative to Poverty

Nutrition attitudes were similarly measured by averaging the mother's scores over three sets of questions. The batteries pertained to perceived importance of dietary guidelines (11 items), importance of safety and nutrition in food purchasing decisions (two items), and beliefs about the relationship between diet and health (three items). The mean attitude scores were similar among the three groups of mothers (63 to 66 percent). Among mothers in higher-income households, however, homemaker mothers had significantly higher attitude scores than full-time working mothers ($p < 0.01$; Exhibit 3.7).

Exhibit 3.7

Mothers' Nutrition Attitude Score, by Employment Status and Household Income Relative to Poverty

The remainder of this chapter presents results from multivariate models of child nutrition outcomes. Covariates include measures of characteristics of the children, their households, and their mothers. Because the DHKS was administered to mothers of only about 15 percent of the sample of children for whom dietary recall data were available, nutrition knowledge and attitude measures are not included in the models. A supplementary analysis, however, restricted to those dyads for which DHKS data were available, found that the estimated regression-adjusted differences were virtually identical when nutrition knowledge and attitude measures were added to the models.

Healthy Eating Index and Component Scores

It was found in Chapter 2 that **children of full-time working mothers** had significantly lower mean HEI scores than their counterparts with homemaker mothers. This was attributable to lower scores for grains, fruit, and variety, despite higher scores for vegetables. These significant results for all ages combined were repeated for 5- to 8-year-olds. Similar results were seen for 9- to 12-year-olds, with the difference that the total fat component was also significantly worse, and the vegetable score was not significantly better. For 2- to 4-year-olds, in contrast, the overall HEI score was significantly higher among children of working mothers, due to higher scores on grains, vegetables, meat, and saturated fat, and despite lower scores on sodium.

Few significant differences were found between **children of part-time working mothers** and homemakers—none for all ages combined, and positive effects for 2- to 4-year-olds, attributable to higher scores for fruit, total fat, saturated fat, and cholesterol. A negative effect was seen with regard to saturated fat for 9- to 12-year-olds.

After taking account of children's age (and teenagers' sex), mother's age, race/ethnicity, and education, the number of adults and children in the household, an index of earnings from other adults, region of the country, and urbanicity, quite similar results are obtained. Mothers' **full-time employment** is associated with a general decrease of 0.6 points in children's HEI ($p < 0.10$), attributable to lower scores on grains, fruit, and variety (Exhibit 3.8). The countervailing positive effect for vegetables loses statistical significance. As in the bivariate analyses, the overall effect is essentially the net effect of strong negative results for 5- to 8-year-olds, and weaker positive results for preschoolers (age 2 to 4). The overall negative difference for 9- to 12-year-old children of full-time working mothers is no longer statistically significant—but it missed statistical significance at the 10 percent level by only a small margin. Regression-adjusted differences for older children (age 9 to 12 and teenagers) are small, with a few scattered marginally significant effects.

The regression-adjusted results for 5- to 8-year-olds look like those for all children, only stronger: significant negative differences for grains, fruit, and variety as well as overall (and a positive difference for vegetables). For preschoolers (age 2 to 4), in contrast, full-time employment is associated with **better** outcomes overall, due to superior scores on grains, vegetables, and meat (and despite inferior scores on sodium).

Again, as in the bivariate analyses, much weaker patterns are seen for **part-time employment**. For all children combined the differences are virtually zero in total HEI score and for each component. A significant positive overall difference is seen for preschoolers, due to fruit and saturated fat, and a significant negative overall difference for 9- to 12-year-olds, due to fruit and total fat.

Exhibit 3.8

Regression-Adjusted Differences for HEI and Component Scores:[a] Working Mothers *versus* Nonworking Mothers

| | | Regression-Adjusted Differences for Maternal Employment Status | |
Outcome	Mean for All Children	Full-time	Part-time
All children			
HEI score	66.1	−0.6*	−0.1
Grain	7.4	−0.1**	−0.0
Vegetable	5.4	0.2	0.0
Fruit	4.6	−0.3**	−0.0
Milk	6.7	−0.1	0.1
Meat	5.8	0.0	−0.1
Total fat	7.3	0.0	−0.0
Saturated fat	5.9	−0.1	−0.1
Cholesterol	8.5	0.0	0.1
Sodium	6.9	0.0	−0.0
Variety	7.7	−0.2***	−0.0
By age group			
2 to 4 years			
HEI score	72.1	0.7**	1.1**
Grain	8.0	0.2***	0.1
Vegetable	5.6	0.4***	0.0
Fruit	6.8	−0.1	0.5***
Milk	7.4	0.1	−0.1
Meat	6.0	0.2**	0.0
Total fat	7.5	0.0	0.1
Saturated fat	5.6	0.2	0.3**
Cholesterol	8.9	0.0	0.1
Sodium	8.6	−0.2***	−0.0
Variety	7.9	0.0	0.0
5 to 8 years			
HEI score	67.4	−0.9*	−0.6
Grain	7.4	−0.2**	−0.0
Vegetable	5.0	0.4***	0.2
Fruit	5.0	−0.5***	−0.4*
Milk	7.5	−0.2	0.0
Meat	5.5	−0.1	−0.0
Total fat	7.3	0.0	0.0
Saturated fat	5.6	0.0	−0.2
Cholesterol	8.8	0.1	−0.0
Sodium	7.6	−0.1	0.0
Variety	7.8	−0.4***	−0.1
9 to 12 years			
HEI score	65.4	−1.3	−1.7*
Grain	7.4	−0.3*	−0.2
Vegetable	5.2	0.0	−0.2

Exhibit 3.8

Regression-Adjusted Differences for HEI and Component Scores:[a] Working Mothers *versus* Nonworking Mothers

Outcome	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	Part-time
Fruit	4.0	−0.5*	−0.6*
Milk	6.8	0.1	0.2
Meat	5.8	0.0	0.2
Total fat	7.3	−0.2	−0.5**
Saturated fat	5.9	−0.3	−0.3
Cholesterol	8.6	0.1	0.1
Sodium	6.3	0.1	−0.0
Variety	8.1	−0.3	−0.3
13 to 17 years, male			
HEI score	61.4	−1.2	0.9
Grain	7.4	0.0	0.4
Vegetable	5.7	0.1	0.3
Fruit	3.0	−0.4	0.1
Milk	6.3	0.1	0.5
Meat	6.7	0.3	−0.2
Total fat	6.9	−0.1	0.1
Saturated fat	6.1	−0.4	−0.4
Cholesterol	7.3	−0.5*	−0.0
Sodium	4.4	−0.1	−0.2
Variety	7.6	−0.2	0.4
13 to 17 years, female			
HEI score	61.9	0.1	0.8
Grain	6.4	−0.4	−0.2
Vegetable	5.5	−0.3	−0.1
Fruit	3.5	0.3	0.8*
Milk	4.5	−0.4	−0.1
Meat	5.4	−0.4	−0.4
Total fat	7.3	0.6*	0.3
Saturated fat	6.5	0.4	0.1
Cholesterol	8.8	0.4	0.3
Sodium	7.2	0.3	0.1
Variety	6.9	−0.4	−0.0

a   Range of scores for the HEI is 0 to 100; ranges for each component of the HEI are 0 to 10.

***   Statistically significant difference at the 1 percent level.
**   Statistically significant difference at the 5 percent level.
*   Statistically significant difference at the 10 percent level.

Multivariate models include the following covariates: indicators for children's age groups (including male and female teenagers); indicators for maternal age under 30, over 40; indicators for maternal race/ethnicity black, Hispanic, other nonwhite; indicators for maternal education less than high school diploma, greater than high school diploma, unknown; number of adults and number of children in household; index for earnings from other adult household members; and indicators for region of country and urbanicity.

The major results, that HEI scores of preschool children of full-time and part-time working mothers are significantly higher than those of their counterparts with homemaker mothers, and that the scores of 5- to 8-year-old children with full-time working mothers are notably lower than those of their counterparts with homemaker mothers, remain unchanged after regression adjustment.

Healthy Eating Index Diet Rating

The results for children's diet rating are also qualitatively similar. It was found in Chapter 2 that there were no statistically significant differences for all age groups combined, but a marked higher likelihood that 9- to 12-year-old children of working mothers *versus* homemaker mothers have poor diets. Likewise, in the multivariate analysis, neither full-time nor part-time maternal employment is associated with a significant difference for all children in the proportion that have either good or poor diets (the middle category, "needs improvement", was omitted; Exhibit 3.9). One marginally significant difference is no longer significant—the effect on the likelihood of poor diet for 5- to 8-year-old children of part-time working mothers).

For 9- to 12-year-olds, part-time employment is associated with an 8.5 percentage point greater likelihood of a poor diet ($p < 0.01$); marginally significant effects associated with full-time employment are seen for both the likelihood of a good diet (3.7 percentage points less) and the likelihood of a poor diet (4.7 percentage points more; $p < 0.10$ for both).

Exhibit 3.9

Regression-Adjusted Differences for HEI Diet Rating: Working Mothers *versus* Nonworking Mothers[a,b]

		Regression-Adjusted Outcomes for Maternal Employment Status	
Outcome	Mean for All Children	Full-time	Part-time
All children			
Good diet	9.3%	−0.9%	0.0%
Poor diet	7.8	1.2	0.2
By age group			
2 to 4 years			
Good diet	24.9%	2.4%	1.3%
Poor diet	2.9	−0.4	−0.8
5 to 8 years			
Good diet	7.5%	−1.5%	0.9%
Poor diet	4.9	0.4	−0.8
9 to 12 years			
Good diet	6.5%	−3.7%*	−2.6%
Poor diet	6.9	4.7*	8.5***
13 to 17 years, male			
Good diet	2.3%	1.5%	1.3%
Poor diet	15.9	0.7	−5.7

Exhibit 3.9

Regression-Adjusted Differences for HEI Diet Rating: Working Mothers *versus* Nonworking Mothers[a,b]

Outcome	Mean for All Children	Regression-Adjusted Outcomes for Maternal Employment Status	
		Full-time	Part-time
13 to 17 years, female			
Good diet	2.7%	–2.1%	–0.7%
Poor diet	12.9	–0.9	–4.8

a   An HEI score over 80 implies a "good diet," an HEI score between 51 and 80 implies a diet that "needs improvement," and an HEI score less than 51 implies a "poor diet."

b   Differences for dichotomous outcomes are expressed as percentage points at the mean.

***   Statistically significant difference at the 1 percent level.
**   Statistically significant difference at the 5 percent level.
*   Statistically significant difference at the 10 percent level.

Multivariate models include the following covariates: indicators for children's age groups (including male and female teenagers); indicators for maternal age under 30, over 40; indicators for maternal race/ethnicity black, Hispanic, other nonwhite; indicators for maternal education less than high school diploma, greater than high school diploma, unknown; number of adults and number of children in household; index for earnings from other adult household members; and indicators for region of country and urbanicity.

Food Energy Intake

Bivariate comparisons showed no significant differences for all children combined in mean percent of the 1989 REA or percent of children with food energy intake above 110 percent of REA; but children of part-time working mothers were significantly less likely to be consuming less than 90 percent of the REA.

Among age groups, infants and children age 1 to 2 and 3 to 4 with full-time working mothers consumed significantly more food energy relative to the REA than corresponding children of home-maker mothers; and the consumption of less than 90 percent of the REA by children of part-time working mothers was attributable to teenage males.

These results are all replicated in the multivariate analysis (Exhibit 3.10). Several other differences in specific age groups attain statistical significance: higher mean energy intake by 3- to 4-year-old children of part-time working mothers; and, for the probability of energy intake less than 90 percent of REA, lower for infants and 1- to 2-year-old children of full-time working mothers, higher for 5- to 8-year-old children of full-time working mothers, and lower for infants of part-time working mothers.

Exhibit 3.10
Regression-Adjusted Differences for Intake of Food Energy: Working Mothers *versus* Nonworking Mothers

Outcome	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	Part-time
All children			
Mean percent of REA	109.4%	0.5%	1.4%
Percent above 110% REA[a]	42.3	0.6	2.1
Percent below 90% REA[a]	32.2	1.2	−5.4*
By age group			
0 to 11 months			
Mean percent of REA	119.1%	5.6%**	3.6%
Percent above 110% REA	53.5	5.3	7.0
Percent below 90% REA	18.2	−4.6*	−6.5*
1 to 2 years			
Mean percent of REA	114.0%	5.6%***	0.5%
Percent above 110% REA	48.8	4.6*	−3.1
Percent below 90% REA	26.5	−4.2*	−2.3
3 to 4 years			
Mean percent of REA	117.4%	3.3%**	3.2%*
Percent above 110% REA	51.9	2.7	1.6
Percent below 90% REA	25.2	−1.1	−1.3
5 to 8 years			
Mean percent of REA	106.9%	−1.7%	−2.4%
Percent above 110% REA	39.6	−0.6	−3.2
Percent below 90% REA	30.3	5.2**	0.7
9 to 12 years			
Mean percent of REA	108.8%	−3.9%	0.9%
Percent above 110% REA	40.4	−2.0	1.3
Percent below 90% REA	32.7	2.3	−1.6
13 to 17 years, male			
Mean percent of REA	113.7%	3.2%	3.6%
Percent above 110% REA	44.3	1.0	11.4
Percent below 90% REA	34.6	−1.9	−27.0***
13 to 17 years, female			
Mean percent of REA	95.7%	0.1%	5.0%
Percent above 110% REA	30.3	−0.2	6.4
Percent below 90% REA	48.2	4.2	−6.4

a   Differences for dichotomous outcomes are expressed as percentage points at the mean.

***   Statistically significant difference at the 1 percent level.
**   Statistically significant difference at the 5 percent level.
*   Statistically significant difference at the 10 percent level.

Multivariate models include the following covariates: indicators for children's age groups (including male and female teenagers); indicators for maternal age under 30, over 40; indicators for maternal race/ethnicity black, Hispanic, other nonwhite; indicators for maternal education less than high school diploma, greater than high school diploma, unknown; number of adults and number of children in household; index for earnings from other adult household members; and indicators for region of country and urbanicity.

Iron and Zinc Intake

The bivariate analyses showed that children of full-time working mothers consumed significantly less iron (as a percent of 2001 RDA) than their counterparts with homemaker mothers, especially 5- to 8-year-olds, 9- to 12-year-olds, and teenage girls. The latter two age groups also consumed less zinc (relative to 2001 RDA) than their counterparts. Among children of part-time working mothers, 1- to 2-year-olds consumed less zinc than their counterparts.

The multivariate results repeat the results for iron, but find in addition significantly positive differences for iron among infant children of full-time and part-time working mothers, and among teenage males with part-time working mothers (Exhibit 3.11). The negative results for zinc are no longer seen for 9- to 12-year-old children and teenage daughters of full-time working mothers, nor for children age 1 to 2 of part-time working mothers. Thus, it can be inferred that the zinc intake differences for those subgroups are attributable to other differences rather than to maternal employment *per se.* Additional positive differences for zinc are found for male teenage children with both full-time and part-time working mothers. As noted in Chapter 2, with most subgroups consuming far in excess of the 2001 RDA for iron and for zinc, differences due to maternal employment may not be important nutritionally.

Exhibit 3.11
Regression-Adjusted Differences for Intake of Iron and Zinc: Working Mothers *versus* Nonworking Mothers

	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	Part-time
All children			
Mean percent of iron RDA	149.2%	−5.5%**	1.2%
Mean percent of zinc RDA	166.5	−1.0	0.6
By age group			
7 to 11 months			
Mean percent of iron RDA	146.0%	17.9%**	15.6%*
Mean percent of zinc RDA	223.9	5.0	−4.4
1 to 2 years			
Mean percent of iron RDA	151.0%	4.6%	0.8%
Mean percent of zinc RDA	240.8	3.8	−6.3
3 to 4 years			
Mean percent of iron RDA	150.8%	−3.1%	4.0%
Mean percent of zinc RDA	226.6	−1.0	6.9
5 to 8 years			
Mean percent of iron RDA	136.7%	−7.6%**	−2.1%
Mean percent of zinc RDA	192.4	−5.9	−3.0
9 to 12 years			
Mean percent of iron RDA	176.5%	−13.4%**	−5.8%
Mean percent of zinc RDA	188.6	−10.6	−7.7

Exhibit 3.11
Regression-Adjusted Differences for Intake of Iron and Zinc: Working Mothers *versus* Nonworking Mothers

	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	Part-time
13 to 17 years, male			
Mean percent of iron RDA	180.1%	13.4%	27.0%**
Mean percent of zinc RDA	160.9	28.0**	29.7**
13 to 17 years, female			
Mean percent of iron RDA	104.3%	−22.4%**	−12.7%
Mean percent of zinc RDA	105.0	−11.4	−8.6

***   Statistically significant difference at the 1 percent level.
**   Statistically significant difference at the 5 percent level.
*   Statistically significant difference at the 10 percent level.

Multivariate models include the following covariates: indicators for children's age groups (including male and female teenagers); indicators for maternal age under 30, over 40; indicators for maternal race/ethnicity black, Hispanic, other nonwhite; indicators for maternal education less than high school diploma, greater than high school diploma, unknown; number of adults and number of children in household; index for earnings from other adult household members; and indicators for region of country and urbanicity.

Dietary Fiber Intake

It was shown in Chapter 2 that children of full-time working mothers consumed significantly less dietary fiber than children of homemaker mothers, especially 9- to 12- year-olds and teenage females. Fiber consumption was also significantly lower among 9- to 12-year-old children of part-time working mothers than among their counterparts with homemaker mothers. These results are repeated in the multivariate analysis (Exhibit 3.12), with an additional significant negative difference for 5- to 8-year-old children of part-time working mothers.

Exhibit 3.12

Regression-Adjusted Differences for Intake of Dietary Fiber: Working Mothers *versus* Nonworking Mothers

	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	Part-time
All children			
Mean percent of dietary fiber recommendation[a]	97.2%	−4.8%**	−4.1%
By age group			
2 to 4 years			
Mean percent of dietary fiber recommendation	129.2%	2.5%	1.8%

Exhibit 3.12

Regression-Adjusted Differences for Intake of Dietary Fiber: Working Mothers *versus* Nonworking Mothers

	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	**Part-time**
5 to 8 years			
Mean percent of dietary fiber recommendation	106.1%	−7.8%***	−6.9%**
9 to 12 years			
Mean percent of dietary fiber recommendation	89.5%	−10.2%**	−9.8%**
13 to 17 years, male			
Mean percent of dietary fiber recommendation	85.9%	1.4%	0.2%
13 to 17 years, female			
Mean percent of dietary fiber recommendation	62.6%	−7.05	−2.0%

a   Based on American Health Foundation recommendation of "age plus 5" grams dietary fiber per day for children age 2 and above (Williams, 1995).

*** Statistically significant difference at the 1 percent level.
** Statistically significant difference at the 5 percent level.
* Statistically significant difference at the 10 percent level.

Multivariate models include the following covariates: indicators for children's age groups (including male and female teenagers); indicators for maternal age under 30, over 40; indicators for maternal race/ethnicity black, Hispanic, other nonwhite; indicators for maternal education less than high school diploma, greater than high school diploma, unknown; number of adults and number of children in household; index for earnings from other adult household members; and indicators for region of country and urbanicity.

Soda Consumption

It was previously shown that children of full-time working mothers were significantly more likely than children of homemaker mothers to drink more than 8 ounces of soda per day (and conversely, less likely to drink no soda). The differences were concentrated among 2- to 4-year-olds and 5- to 8-year-olds. Although there were no significant overall differences for children of part-time working mothers, there appeared to be a positive difference for teenage males (less likely to drink no soda).

The multivariate analysis finds the same patterns (Exhibit 3.13). In addition, the large positive differ-ence in the likelihood of drinking more than 8 ounces of soda a day, seen for teenage daughters of part-time working mothers relative to their counterparts with homemaker mothers, achieves statistical significance.

Exhibit 3.13

Regression-Adjusted Differences for Daily Consumption of Soda: Working Mothers *versus* Nonworking Mothers[a]

	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	Part-time
All children			
None	43.9%	−3.7%*	−3.5%
More than 8 ounces	20.7	3.6**	5.4
By age group			
2 to 4 years			
None	51.5%	−5.7%***	0.6%
More than 8 ounces	9.7	0.5	−2.1
5 to 8 years			
None	42.7%	−8.8%***	−1.2%
More than 8 ounces	18.3	6.7***	1.6
9 to 12 years			
None	34.1%	1.3%	−3.9%
More than 8 ounces	38.7	0.8	5.6
13 to 17 years, male			
None	16.9%	−3.5%	−10.2%*
More than 8 ounces	69.8	6.0	6.6
13 to 17 years, female			
None	20.4%	−0.6%	−5.7%
More than 8 ounces	55.5	4.6	20.9***

a   Differences for dichotomous outcomes are expressed as percentage points at the mean.

***   Statistically significant difference at the 1 percent level.
**   Statistically significant difference at the 5 percent level.
*   Statistically significant difference at the 10 percent level.

Multivariate models include the following covariates: indicators for children's age groups (including male and female teenagers); indicators for maternal age under 30, over 40; indicators for maternal race/ethnicity black, Hispanic, other nonwhite; indicators for maternal education less than high school diploma, greater than high school diploma, unknown; number of adults and number of children in household; index for earnings from other adult household members; and indicators for region of country and urbanicity.

Other Soft Drink Consumption

No significant differences were seen in Chapter 2 with regard to consumption of other soft drinks for all ages combined. Scattered significant effects were seen for children of part-time working mothers: 2- to 4-year-old children were significantly more likely to drink none, and 9- to 12-year-old children were significantly more likely to drink over 8 ounces, than their counterparts with homemaker mothers.

The overall lack of significant differences was repeated in the multivariate analyses, as was the age-specific result for 9- to 12-year-olds (Exhibit 3.14). A few additional differences achieved statistical significance: for children of part-time working mothers, 5- to 8-year-olds were less likely to drink no other soft drinks, and more likely to drink over 8 ounces, than their counterparts with homemaker mothers, and teenage sons of part-time working mothers were more likely to drink over 8 ounces than their counterparts with homemaker mothers.

Exhibit 3.14

Regression-Adjusted Differences in Daily Consumption of Other Soft Drinks: Working Mothers *versus* Nonworking Mothers[a,b]

	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	Part-time
All children			
None	41.0%	−0.8%	−3.3%
More than 8 ounces	23.1	−0.2	1.2
By age group			
2 to 4 years			
None	42.1%	−4.0%**	2.9%
More than 8 ounces	20.1	1.0	−2.6
5 to 8 years			
None	38.2%	1.1%	1.9%
More than 8 ounces	24.5	−2.9	−7.0**
9 to 12 years			
None	39.2%	−0.2%	−9.1%*
More than 8 ounces	26.2	1.0	8.8**
13 to 17 years, male			
None	48.2%	2.1%	−8.1%
More than 8 ounces	30.7	−3.0	11.3*
13 to 17 years, female			
None	38.5%	−3.9%	−5.6%
More than 8 ounces	32.9	3.8	−2.8

a   Includes fruit drinks (not juice), iced tea, lemonade.

b   Differences for dichotomous outcomes are expressed as percentage points at the mean.

***   Statistically significant difference at the 1 percent level.
**   Statistically significant difference at the 5 percent level.
*   Statistically significant difference at the 10 percent level.

Multivariate models include the following covariates: indicators for children's age groups (including male and female teenagers); indicators for maternal age under 30, over 40; indicators for maternal race/ethnicity black, Hispanic, other nonwhite; indicators for maternal education less than high school diploma, greater than high school diploma, unknown; number of adults and number of children in household; index for earnings from other adult household members; and indicators for region of country and urbanicity.

Added Sugar Intake

No significant differences were seen for all age groups combined for added sugar intake in Chapter 2. For children age 2 to 4 and 5 to 8 of full-time working mothers, however, intake of added sugar from all sources, and in particular intake of added sugar from soda and other soft drinks, was significantly greater than among their counterparts with homemaker mothers.

Similarly, the multivariate analyses find no significant differences for all age groups combined (Exhibit 3.15). The patterns of significant differences for age groups are a little different, however. Among children of full-time working mothers, only the difference for all sources of added sugar for 5- to 8-year-olds remains statistically significant; and two differences in added sugar from soda and other soft drinks achieve statistical significance for children of part-time working mothers relative to their counterparts with homemaker mothers: a positive difference for 9- to 12-year-olds, and a negative difference for teenage males. It appears that other differences, rather than maternal employment *per se*, explain the greater intake of added sugars by 2- to 4-year-old children of full-time working mothers.

Exhibit 3.15

Regression-Adjusted Differences for Intake of Added Sugars (teaspoons per day): Working Mothers *versus* Nonworking Mothers

	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	Part-time
All children			
Added sugar from all sources	22.9	0.4	0.5
Added sugar from soda and other soft drinks	10.1	0.4	−0.0
By age group			
2 to 4 years			
Added sugar from all sources	14.5	0.6	−0.3
Added sugar from soda and other soft drinks	5.1	0.4	−0.3
5 to 8 years			
Added sugar from all sources	19.6	1.0*	−0.1
Added sugar from soda and other soft drinks	6.8	0.7	−0.3
9 to 12 years			
Added sugar from all sources	25.1	−0.5	1.5
Added sugar from soda and other soft drinks	10.1	−0.0	1.2*
13 to 17 years, male			
Added sugar from all sources	35.1	−0.1	−1.0
Added sugar from soda and other soft drinks	19.5	−0.1	−2.3**

Exhibit 3.15

Regression-Adjusted Differences for Intake of Added Sugars (teaspoons per day): Working Mothers *versus* Nonworking Mothers

13 to 17 years, female			
Added sugar from all sources	23.9	1.4	2.6
Added sugar from soda and other soft drinks	12.6	1.2	1.0

***   Statistically significant difference at the 1 percent level.
**   Statistically significant difference at the 5 percent level.
*   Statistically significant difference at the 10 percent level.

Multivariate models include the following covariates: indicators for children's age groups (including male and female teenagers); indicators for maternal age under 30, over 40; indicators for maternal race/ethnicity black, Hispanic, other nonwhite; indicators for maternal education less than high school diploma, greater than high school diploma, unknown; number of adults and number of children in household; index for earnings from other adult household members; and indicators for region of country and urbanicity.

Consumption of Fried Potatoes and Other Vegetables

Finally, children of full-time working mothers were previously found to consume significantly more fried potatoes than children of homemaker mothers, especially children age 2 to 4 and 5 to 8. In addition, children age 2 to 4 consumed more of other vegetables if their mothers were working full-time.

These results are all repeated in the multivariate analysis (Exhibit 3.16). Several other differences achieved significance: greater consumption of fried potatoes by teenage sons of both full-time and part-time working mothers relative to their counterparts with homemaker mothers, and lesser consumption of other vegetables by teenage daughters of full-time working mothers and teenage sons of part-time working mothers.

Summary

The results presented in Chapter 2 were simple comparisons of means and proportions among groups of children that differed by maternal employment status, adjusted only for differences in the age distributions. It might be expected that conclusions based on these comparisons would need to be modified when other differences among the groups were taken into account.

In fact, the three groups of children differ in some important ways. Children of homemaker mothers are more likely to be Hispanic or non-Hispanic white, poor, and from large households than children of working mothers. The homemaker mothers themselves tend to be younger, less well-educated, and less knowledgeable about nutrition than working mothers. Resources available from other earners are greatest, on average, in households with part-time working mothers, and lowest in households with full-time working mothers.

Controlling for these factors does not, however, substantively alter the conclusions drawn in Chapter 2. The analysis still finds that children whose mothers work full-time tend to have less positive nutrition outcomes than children of nonworking mothers.

Exhibit 3.16

Regression-Adjusted Differences for Consumption of Fried Potatoes and Other Vegetables (servings per day): Working Mothers *versus* Nonworking Mothers

	Mean for All Children	Regression-Adjusted Differences for Maternal Employment Status	
		Full-time	Part-time
All children			
Fried potatoes	0.7	0.1***	0.1*
Vegetables other than fried potatoes	1.9	−0.1	−0.1
By age group			
2 to 4 years			
Fried potatoes	0.5	0.1**	0.1
Vegetables other than fried potatoes	1.7	0.1**	−0.0
5 to 8 years			
Fried potatoes	0.5	0.2***	0.1
Vegetables other than fried potatoes	1.6	−0.0	0.0
9 to 12 years			
Fried potatoes	0.7	0.1	−0.0
Vegetables other than fried potatoes	1.9	−0.2	−0.1
13 to 17 years, male			
Fried potatoes	1.0	0.3***	0.5***
Vegetables other than fried potatoes	2.7	−0.0	−0.5**
13 to 17 years, female			
Fried potatoes	0.7	−0.0	0.1
Vegetables other than fried potatoes	2.1	−0.3*	−0.3

*** Statistically significant difference at the 1 percent level.
** Statistically significant difference at the 5 percent level.
* Statistically significant difference at the 10 percent level.

Multivariate models include the following covariates: indicators for children's age groups (including male and female teenagers); indicators for maternal age under 30, over 40; indicators for maternal race/ethnicity black, Hispanic, other nonwhite; indicators for maternal education less than high school diploma, greater than high school diploma, unknown; number of adults and number of children in household; index for earnings from other adult household members; and indicators for region of country and urbanicity.

The multivariate and bivariate results are contrasted in Exhibit 3.17. The bolded entries represent differences that were significant in the bivariate analyses only. It can be seen that these are relatively few in number, and generally pertain to specific age groups. The only result for all age groups combined that lost significance was the positive effect for the vegetable component of the HEI for children of full-time mothers. Thus, this analysis is consistent with the hypothesis that for most child nutrition outcomes, the differences between children of full-time working and homemaker mothers are related to maternal employment *per se*, rather than the result of other differences between the groups.

Exhibit 3.17

Summary of Significant Differences in Bivariate and Multivariate Analyses

	Full-time *versus* Homemaker		Part-time *versus* Homemaker	
	Significant Differences (bivariate)	**Significant Differences (multivariate)**	**Significant Differences (bivariate)**	**Significant Differences (multivariate)**
Total HEI	All children (–)	All children (–)	Age 2-4 (+)	Age 2-4 (+)
	Age 2-4 (+)	Age 2-4 (+)		*Age 9-12 (–)*
	Age 5-8 (–)	Age 5-8 (–)		
	Age 9-12 (–)			
Grain	All children (–)	All children (–)		
	Age 2-4 (+)	Age 2-4 (+)		
	Age 5-8(–)	Age 5-8(–)		
	Age 9-12 (–)	Age 9-12 (–)		
Vegetable	**All children (+)**			
	Age 2-4 (+)	Age 2-4 (+)		
	Age 5-8 (+)	Age 5-8 (+)		
Fruit	All children (–)	All children (–)	Age 2-4 (+)	Age 2-4 (+)
	Age 5-8 (–)	Age 5-8 (–)		*Age 5-8 (–)*
	Age 9-12 (–)	Age 9-12 (–)		*Age 9-12 (–)*
				Age 13-17F (+)
Milk	**Age 5-8 (–)**			
Meat	Age 2-4 (+)	Age 2-4 (+)		
	Age 13-17F (–)			
Total fat	**Age 9-12 (–)**	Age 13-17F (+)	**Age 2-4 (+)**	
			Age 9-12 (–)	Age 9-12 (–)
Saturated fat	**Age 2-4 (+)**		Age 2-4 (+)	Age 2-4 (+)
	Age 13-17M (–)			
Cholesterol		*Age 13-17M (–)*	**Age 2-4 (+)**	
Sodium	Age 2-4 (–)	Age 2-4 (–)		
Variety	All children (–)	All children (–)		
	Age 5-8 (–)	Age 5-8 (–)		
	Age 9-12 (–)			
	Age 13-17F (–)			
Good diet	**Age 2-4 (+)**		**Age 2-4 (+)**	
		Age 9-12 (–)		
Poor diet			**Age 5-8 (–)**	
	Age 9-12 (+)	Age 9-12 (+)	Age 9-12 (+)	Age 9-12 (+)
Food energy: mean percent of REA	Age 0-11m (+)	Age 0-11m (+)		*Age 3-4 (+)*
	Age 1-2 (+)	Age 1-2 (+)		
	Age 3-4 (+)	Age 3-4 (+)		
Food energy: above 110% REA		*Age 1-2 (+)*		
Food energy: below 90% REA			All children (–)	All children (–)
		Age 0-11m (–)		*Age 0-11m (–)*
		Age 1-2 (–)	Age 13-17M (–)	Age 13-17M (–)
		Age 5-8 (+)		

Exhibit 3.17

Summary of Significant Differences in Bivariate and Multivariate Analyses

	Full-time *versus* Homemaker		Part-time *versus* Homemaker	
	Significant Differences (bivariate)	**Significant Differences (multivariate)**	**Significant Differences (bivariate)**	**Significant Differences (multivariate)**
Iron	All children (–) Age 5-8 (–) Age 9-12 (–) Age 13-17F (–)	All children (–) *Age 7-11m (+)* Age 5-8 (–) Age 9-12 (–) Age 13-17F (–)		*Age 7-11m (+)* *Age 13-17M (+)*
Zinc	**Age 9-12 (–)** **Age 13-17F (–)**	*Age 13-17M (+)*	**Age 1-2 (–)**	*Age 13-17M (+)*
Fiber	All children (–) Age 5-8 (–) Age 9-12 (–) **Age 13-17F (–)**	All children (–) Age 5-8 (–) Age 9-12 (–)	Age 9-12 (–)	*Age 5-8 (–)* Age 9-12 (–)
Soda: None	All children (–) Age 2-4 (–)	All children (–) Age 2-4 (–) *Age 5-8 (–)*	**Age 9-12 (–)** Age 13-17M (–)	Age 13-17M (–)
Soda: more than 8 ounces	All children (+) Age 5-8 (+)	All children (+) Age 5-8 (+)	Age 2-4 (–)	*Age 13-17F (+)*
Other soft drinks: None		*Age 2-4 (–)*	**Age 2-4 (+)**	*Age 9-12 (–)*
Other soft drinks: more than 8 ounces			Age 9-12 (+)	*Age 5-8 (–)* Age 9-12 (+) *Age 13-17 (+)*
Added sugar from all sources	**Age 2-4 (+)** Age 5-8 (+)	Age 5-8 (+)		
Added sugar from soda and other soft drinks	**Age 2-4 (+)** **Age 5-8 (+)**			*Age 9-12 (+)* *Age 13-17M (–)*
Fried potatoes	All children (+) Age 2-4 (+) Age 5-8 (+)	All children (+) Age 2-4 (+) Age 5-8 (+) *Age 13-17M (+)*		*All children (+)* *Age 13-17M (+)*
Vegetables other than fried potatoes	Age 2-4 (+)	Age 2-4 (+) *Age 13-17F (–)*		*Age 13-17M (–)*

Bolded results are significant in bivariate analyses only. *Italicized* results are significant in multivariate analyses only

Among the key results repeated in the multivariate analysis for all ages combined, comparing children of full-time working mothers to children of homemaker mothers, are that the total HEI score is lower, as well as the scores for the grain, fruit, and variety components; iron intake is lower; and intake of soda and fried potatoes is higher. For children of part-time working mothers, the finding for all ages combined of a lower likelihood of energy intake below 90 percent of the REA is replicated.

Age-specific differences for children of full-time working mothers that remain significant are:

- For preschoolers, higher total HEI scores, higher scores for the vegetable and meat components, and lower scores for the sodium component.

- Also for preschoolers, higher intake of food energy, a greater likelihood of consuming some soda, and higher consumption of both fried potatoes and other vegetables.

- For school-age children (children age 5 to 8 and/or age 9 to 12), lower total HEI scores, lower scores for the grain, fruit, and variety components, but higher scores for the vegetable component.

- Also for school-age children, lower intake of iron, zinc, and fiber, greater likelihood of consuming over 8 ounces of soda, and higher consumption of fried potatoes.

- For teenage girls, lower intake of iron.

The results for teenage girls with regard to zinc and fiber did not retain statistical significance. These two differences thus appear to be due to other differences between the groups.

Comparing children of part-time working mothers with children of homemaker mothers within age groups, differences that remain significant in the multivariate analysis include:

- For preschoolers, higher total HEI scores, higher scores on the fruit and saturated fats components, and lower likelihood of drinking more than 8 ounces of soda.

- For school-age children, higher scores on the total fat component of HEI, lower intake of fiber, and greater likelihood of drinking more than 8 ounces of soft drinks other than soda.

- For teenage boys, lower likelihood of food energy intake under 90 percent of the REA, and higher likelihood of drinking at least some soda.

Other differences that lost significance include lower intake of zinc for 1-to-2-year-olds, greater likelihood of consuming at least some soda for 9-to-12-year-olds, and lower likelihood of consuming other soft drinks for 2-to-4-year-olds.