

**A Monthly Cycle in Food Expenditure and Intake  
by Participants in the U.S. Food Stamp Program**

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## **Abstract**

This paper uses nationally representative data to describe monthly cycles in food expenditure and food intake by food stamp recipients. Food expenditure peaks sharply in the first 3 days after food stamps are received. The corresponding cycle in food intake differs for various categories of food stamp recipients. Food stamp recipients who also receive AFDC appear to maintain steady food intake across the whole month, while AFDC nonrecipients experience a significant drop in intake at the end of the month. Children appear to maintain steady food intake, while adults appear to experience a significant drop. Households that conduct major grocery shopping trips more frequently than once per month maintain steady food intake, while households that shop less frequently experience a significant drop.

The food stamp cycle has implications for two areas of research: the measurement of hunger and food insecurity in the United States and the measurement of the impact of the U.S. Food Stamp Program. Intramonthly patterns in food expenditure and food intake have potential implications for policy decisions about the frequency of food stamp benefit delivery, the evaluation of new electronic benefit transfer systems that are replacing traditional food stamp coupons, and nutrition education efforts.

## **A Monthly Cycle in Food Expenditure and Intake by Participants in the U.S. Food Stamp Program**

### I. INTRODUCTION

Food stamp recipients spend benefits and consume food unevenly over time. Food expenditure peaks sharply in the first 3 days after food stamps are received. Actual food intake drops at the end of the month, for some foods and some people, although food intake over time is always smoother than food expenditure. These patterns show that program participants commonly store food at home to reduce fluctuations in food consumption, but home storage does not eliminate the fluctuations altogether. Many food stamp recipients experience repeated periods of food plenty and food scarcity, with welfare and nutritional consequences that are not yet well understood.

This research measures these monthly cycles nationally for the first time, but their broad outlines have been well known for years among researchers and officials responsible for the Food Stamp Program. In the press, these cycles have been described with some alarm. “Inevitably,” Joseph Lelyveld wrote in the *New York Times Magazine* (Lelyveld 1985), “most food-stamp families live on a nutritional cycle that starts off reasonably well, then deteriorates as the month wears on, becoming marginal if not desperate in the final week or 10 days, depending on how frugal they were earlier. . . . The cyclical nature of undernutrition in America—the monthly slide to a meager diet of starches that will stave off the sensation of hunger—cannot be good for the health of the poor. . . .”

The monthly food stamp cycle has implications for two fields of research that have received much attention in recent years. The first is the measurement of hunger and food insecurity, which depends on information about the timing and duration of spells without food. For example, the food stamp cycle has been linked to a cycle in the use of soup kitchens. In a study involving two samples from New York City and Upstate New York, Thompson et al. (1988) found that the mean number of meals served weekly in soup kitchens followed a sharp sawtooth pattern over the year, with a peak at the end of

almost every month. Similarly, a study of the nutritional adequacy of diets in low-income families in Cleveland found that most food is purchased in the first 2 weeks of the month (Emmons 1986). Just as we find with national data, the Cleveland study concluded that food intake is much steadier over the food stamp month than is food spending. At a 1994 conference on food security measurement and research, Steve Carlson recommended further research in this area: “We need to work harder to figure out how we can identify, measure, and assess the consequences of a recurrent or cyclical pattern of hunger, for example, at the end of each month” (Food and Consumer Service 1994).

The second field of research is the measurement of the impact of the U.S. Food Stamp Program on food spending and food intake. Past research on food stamps has used data from surveys that inquire about short periods of food expenditure or food use for each respondent. It makes a difference whether these short periods occur early or late in the food stamp month. In a 1990 survey of this literature on the Food Stamp Program, Thomas Fraker discussed the state of research on the monthly cycle: “Despite the fact that it may enhance our understanding of why econometric studies show that food stamps have a much larger effect on food use than does cash income, research on the existence and nature of this cycle has been scarce” (Fraker 1990).

The analytic approach in our paper is spare, since no further complexity seems necessary to unearth some key results. Most results are mean expenditures or mean intakes at different times of the month, for food in general or for particular categories of foods and nutrients. Alternative approaches, which model the decisions of food stamp recipients over time in a framework consistent with the theory of rational choice, have been pursued elsewhere (Wilde and Ranney 1997; Wilde 1998). Model-based approaches offer an opportunity to sort through the distinct effects of several variables on the food stamp cycle in a manner not possible with the univariate comparisons in this paper. The approach followed here, however, is less reliant on a particular model or theory. For understanding the food stamp cycle, this paper is an essential first step.

After discussing methodology (Section II), the main results of this report are presented in the next two sections on patterns in total food expenditure and intake (Section III) and patterns for particular foods and particular nutrients (Section IV). The concluding section (Section V) addresses implications for food stamp policy and for future research.

## II. METHODOLOGY

This research employs two nationally representative surveys. The Diary Consumer Expenditure Survey (CEX) from the Bureau of Labor Statistics reports spending by consumer units on food and other frequently purchased items (U.S. Department of Labor 1992). The Continuing Survey of Food Intake by Individuals (CSFII) from the U.S. Department of Agriculture reports actual food intake by household members (U.S. Department of Agriculture 1991). Together, these surveys provide a wealth of information about patterns in food spending and intake over the food stamp month.

The expenditure survey contains highly detailed information on one week of purchases by a consumer unit (usually a family). For most consumer units, the expenditure part of the survey was administered twice, thereby providing 14 days of data. The CEX contains a wealth of geographic and demographic information at the level of the consumer unit, but only partial information about individual members.

The intake survey covers a shorter span of time. One day of detailed information on food intake was collected by a trained enumerator. In most cases, 2 more days of information were reported by recipients using blank forms left by the enumerator. Because there are some systematic differences between the two data collection methods, this study uses 3-day means of food intake for only those households with complete intake data. The CSFII contains food intake information at the individual level and demographic information at both the individual and the household level.

Both surveys asked food stamp recipients the amount of their benefits and the date on which they last received food stamps. Because the date of each expenditure or intake event is also known, the number of days since food stamps were received may be calculated by subtraction. The food stamp month is defined in terms of this interval. While food stamp benefits tend to become available early in the calendar month, they do not arrive uniformly on the first day of the month, so the food stamp month does not correspond precisely to a calendar month. It is rather a hypothetical month where the arrival of food stamps marks Day 0, and the remaining days are numbered from that starting point.

The CSFII data are from food intake surveys conducted in 1989–1991. The following round of this survey began in 1994 and was not completed at the time of this research. Since the CEX is conducted every year, nearby years (1988–1992) are selected so that the expenditure and intake data generally refer to the same period. All expenditure values are converted to real January 1990 dollars using the Consumer Price Index (CPI) for all goods. Because the CPI is reported monthly, a linear interpolation is employed to avoid having small spurious jumps in expenditure between the end of one month and the start of the next.

Even after selecting only food stamp recipients with complete food stamp date information, the sample size for the expenditure data set is more than sufficient (Table 1). For example, one can investigate mean food expenditure for each day of the food stamp month and still have adequate sample sizes. The intake data set is smaller, requiring more judicious splitting of the sample. In this paper, the food stamp month is divided into just 4 weeks for purposes of measuring food intake (Week 1 represents Days 0–6 of the food stamp month). In order to compare food expenditure with food intake, most of the expenditure results are also reported on a weekly basis.

Thus, the analysis is conducted with a main expenditure data set that has 12,308 daily spending observations for consumer units in the first 4 weeks of the food stamp month. The main intake data set has 1,516 observations, each of which is a 3-day mean for one individual. For most of the analysis, the

TABLE 1

## Sample Sizes in the CEX and CSFII Data

CEX (1988–1992)		CSFII (1989–1991)	
<i>Total CU observations</i>	58,250	<i>Total households</i>	6,718
<i>Food stamp CU observations</i>	3,124	<i>Food stamp households</i>	1,003
<i>Food stamp CU observations with complete dates<sup>a</sup></i>	2,825	<i>Food stamp households with complete dates</i>	979
		<i>Households with dates in 4-week food stamp month<sup>b</sup></i>	639
<i>Individuals in food stamp CU observations</i>	9,530	<i>Individuals in households in 4-week food stamp month</i>	1,516
<i>CU spending days observed</i>	19,775		
<i>CU spending days observed in 4-week food stamp month</i>	12,308	<i>Individual intake days observed in 4-week food stamp month</i>	4,548

<sup>a</sup>One CU observation is a weekly observation on a food stamp consumer unit. Because most CUs in the CEX were surveyed for 2 weeks, this value represents 1,675 distinct CUs.

<sup>b</sup>The 4-week food stamp month is the first 4 weeks after food stamps are received.

final 0–3 days of the food stamp month, from Day 28 onward, are omitted because the sample sizes are smaller for this fraction of a week and also because we had other concerns with the reliability of the data for this period.<sup>1</sup>

Because food needs differ systematically by age, sex, and pregnancy/lactating status, food intake results are reported using an Adult Male Equivalent (AME) scale that accounts for these differences. The AME scale is based on the Recommended Dietary Allowance (RDA) for total food energy intake (National Research Council 1989), even when results are reported for specific foods and macronutrients, so that differences between results are always due to real differences in intake and not differences in the scaling factor. For selected micronutrients, intake figures are described in proportion to the corresponding RDAs for those nutrients so that the seriousness of potential deficiencies can be assessed. The expenditure survey does not include sufficient information on individuals to construct an AME scale, so expenditure results are reported on a per-person basis.

Mean values are calculated for each variable of interest—for example, “food energy intake by children as a percentage of the RDA” or “expenditure on meat per person in the consumer unit”—in each week of the food stamp month. For each variable, a one-tailed *t*-test is employed to test the null hypothesis that the Week 1 value is no greater than the Week 4 value. The tests with the CEX data are significant in every case, so this result is not reported repetitiously for the remainder of this paper. With the CSFII data, significantly lower Week 4 intake means (at  $\alpha = .05$ ) are marked with the traditional star, and “nearly” significant results are labeled with the *t*-test statistic so that readers may judge for themselves.

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<sup>1</sup>Food expenditure appears slightly higher in the final 0–3 days of the food stamp month than it does in Week 4 (see Figure 1A), but we suspect this appearance is due to a measurement problem. Food stamps do not always arrive precisely at monthly intervals, so some recipients who seem to be at the very end of the food stamp month may actually be at the start of their next food stamp cycle.



Both surveys use complex sampling designs, and both provide weights to use in generating estimates of population values. The method for estimating population means using weights is straightforward, although the well-known formulas for standard errors under random sampling generate biased results, whether or not the sampling weights are used. The CEX data contain 44 columns of half-sample weights so that consistent standard errors can be calculated using replication methods. Although these standard errors for expenditure estimates are computed here with the SAS statistical package, the methodology was double-checked in a smaller subsample using the program WesVarPC, which is designed to analyze complex survey data using replication methods. For the CSFII data, estimates are calculated with the statistical software package SUDAAN, which accommodates complex survey designs using analytically derived formulas for linear statistics, and using Taylor series approximations for nonlinear statistics. The estimated standard errors are again double-checked with WesVarPC, which yields similar estimates.

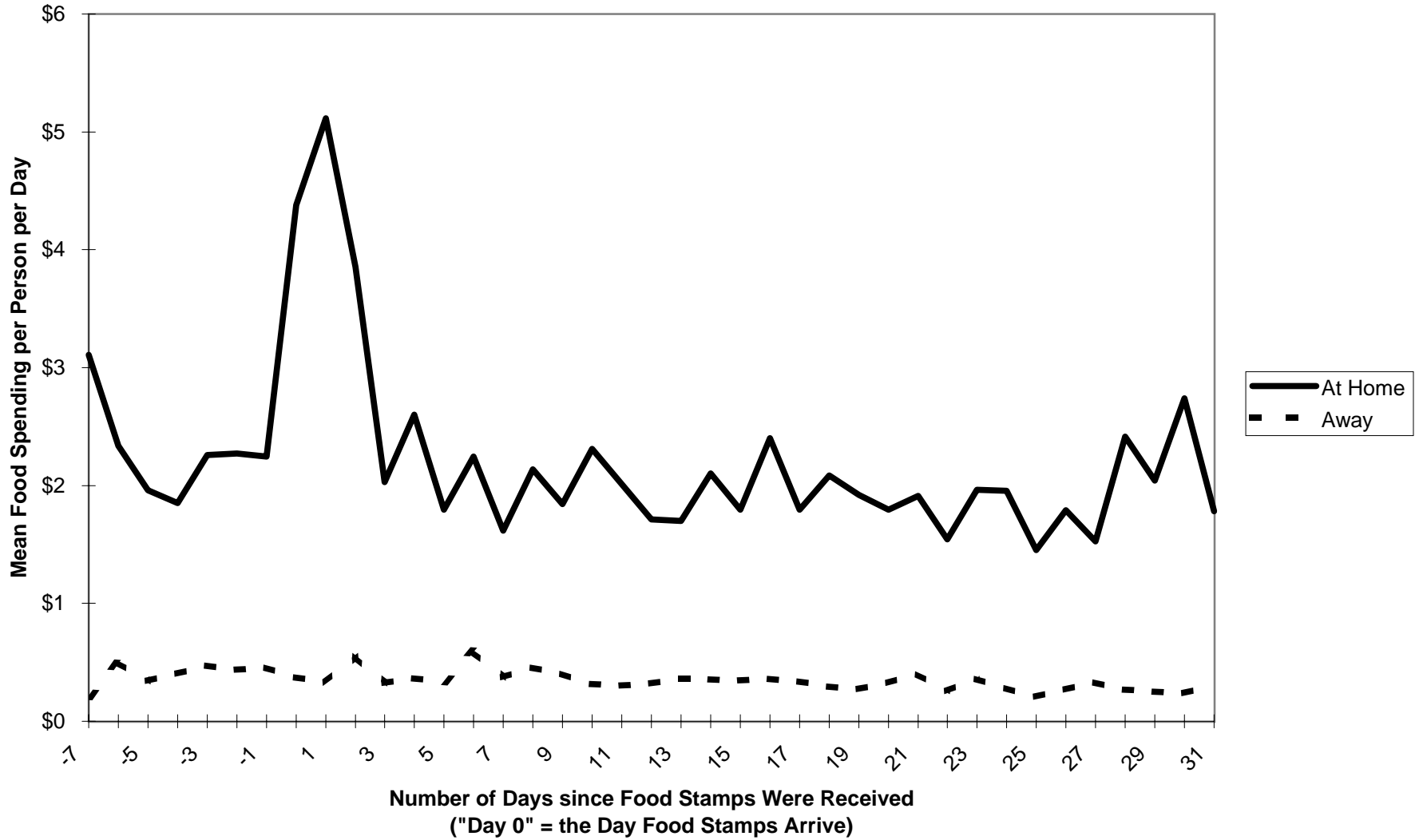
### **III. TOTAL FOOD EXPENDITURE AND INTAKE**

This section reports monthly patterns in total food spending and intake. The first subsection describes patterns for the full sample of food stamp recipients. The remaining subsections discuss food stamp individuals and households that may have distinct food behavior: AFDC recipients and nonrecipients, female-headed and dual-headed households, frequent and infrequent grocery shoppers, and adults and children.

#### Expenditure and Intake for All Food Stamp Recipients

The pattern in total food expenditure is striking. Mean daily expenditure per person on food at home peaks sharply in the first 3 days of the food stamp month and flattens out at a much lower level for the remainder (Figure 1A). Expenditure on food away from home, which may not be purchased legally

**Figure 1A**  
**Food Expenditure by Consumer Units, at Home and Away from Home**



with food stamps, is much more steady over the food stamp month. Restaurant food may be purchased more often right after households receive cash rather than after they receive food stamps, but that pattern would not show up in our data.

The monthly pattern in food intake is less dramatic (Figure 1B). Mean food energy intake, measured as the 3-day mean of caloric intake divided by the appropriate RDA for each individual, remains steady for the first 3 weeks and dips moderately in Week 4.<sup>2</sup> This dip is small enough that it could be due to sampling variation. As noted below in this section and the next, this pattern in total food intake for the full sample is muted by the inclusion of different household types and different foods. Some household types and some foods do exhibit a significant fall in food intake.

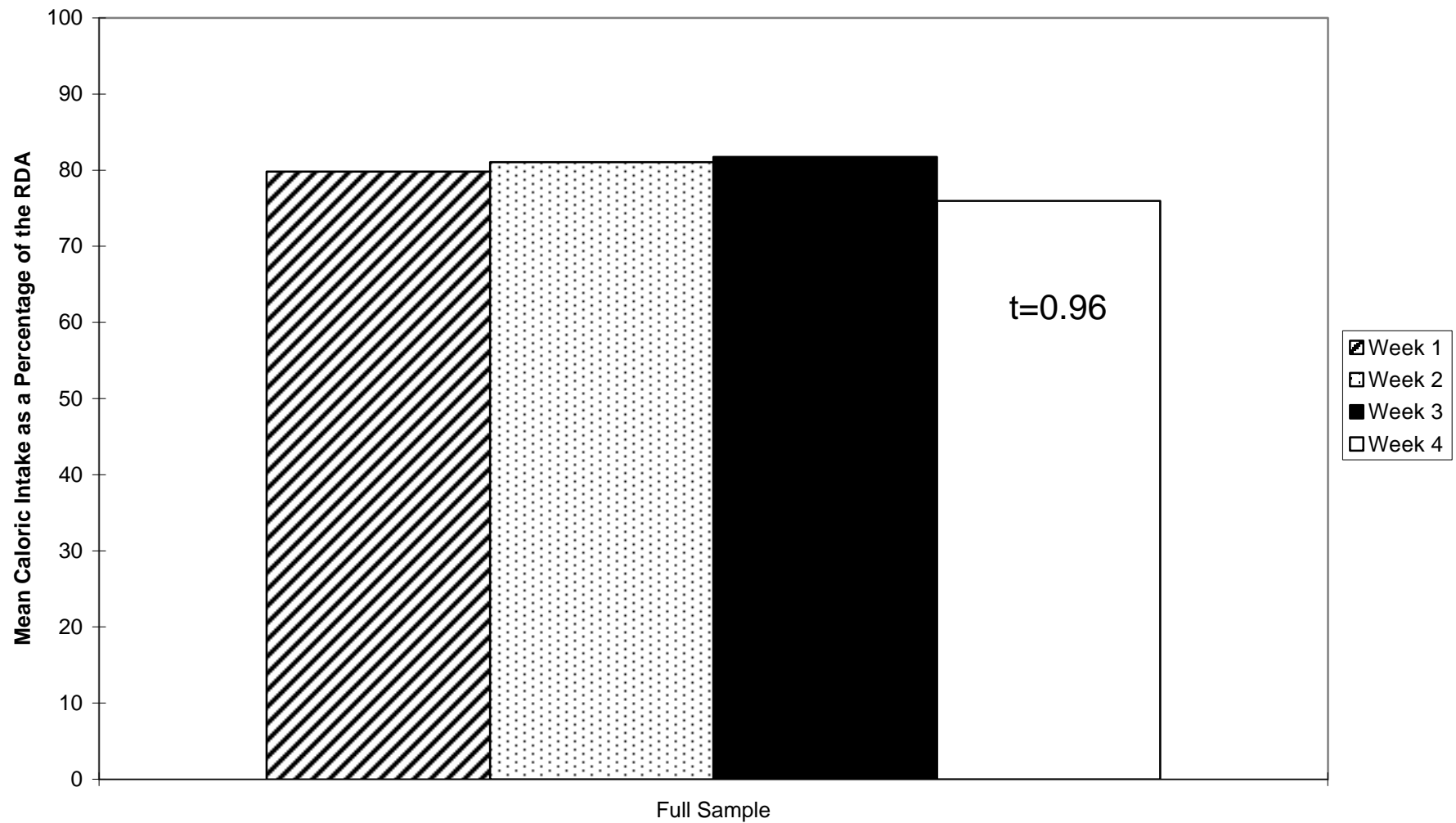
#### Expenditure and Intake for Joint Food Stamp-AFDC Recipients

With over 25 million participants each month last year, or almost one out of ten Americans, the Food Stamp Program cuts a broader swath through the American population than the archetypal cash welfare program, Aid to Families with Dependent Children (AFDC). Ninety percent of the approximately 5 million families participating in AFDC receive food stamps. These AFDC families make up about half of all food stamp families (50.6 percent of food stamp households in the 1989–1991 CSFII sample received AFDC). Relatively small numbers of food stamp households that receive AFDC have other important sources of cash income such as wage earnings or social security. By contrast, over half of all non-AFDC food stamp households in the CSFII sample receive social security or Supplemental Security Income benefits, and over a third have some wage earnings. As a consequence of their higher levels of cash resources, non-AFDC recipient families get lower food stamp benefits (\$83

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<sup>2</sup>Even in the first 3 weeks the caloric intake seems low, relative to the RDA, but this reflects the difficulty of collecting complete intake data in a survey, not general undernutrition. Mean food energy intake as a percentage of the RDA is just as low for CSFII respondents who do not receive food stamps (Tippett et al. 1995), probably due to underreporting of intake.

**Figure 1B**  
**Food Intake by Individuals**



**Note:** The  $t$ -statistic is for a one-tailed test of the difference between Week 4 intake and Week 1 intake.

per adult male equivalent per month in the CSFII sample) than AFDC recipient families get (\$103 per adult male equivalent per month).

The monthly food cycle is very different for food stamp recipients who receive AFDC and those who do not. The main difference is in food intake patterns, rather than food spending. AFDC recipients and nonrecipients both spend heavily on food in the first 3 days of the food stamp month (Figure 2A).<sup>3</sup> Despite the similar spending patterns, only AFDC nonrecipients have a significant dip in food energy intake in Week 4 (Figure 2B). The estimated difference between Week 1 intake and Week 4 intake for nonrecipients is too big to be due to sampling variation. Because AFDC nonrecipients receive lower food stamp benefits on average, it is perhaps surprising that they have a more noticeable monthly food intake cycle. This difference could indicate that some aspect of the AFDC program—perhaps the receipt of cash benefits twice monthly—ameliorates food shortages at the end of the food stamp month. On the other hand, other household characteristics or government programs associated with AFDC participation could be responsible.

#### Expenditure and Intake for Female-Headed Households

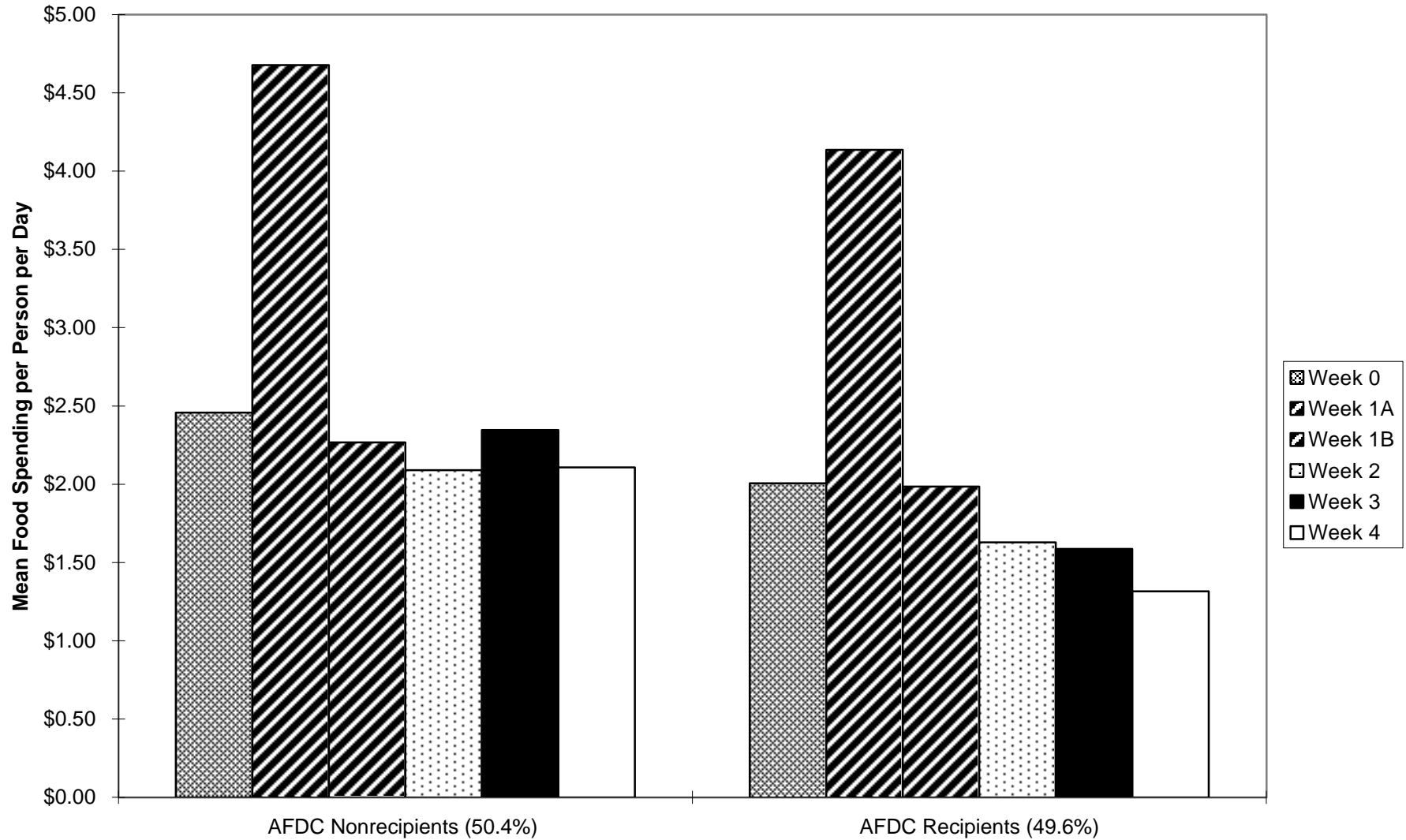
AFDC recipients live disproportionately in female-headed households. Almost 70 percent of individuals in AFDC families in the CSFII sample live in female-headed households, while only 43 percent of individuals in other food stamp families live in female-headed households. Household headship and AFDC receipt interact to influence the monthly cycle in food intake.

According to the CEX data, households with a female head only, with a male head only, and with two household heads all have a significant spike in mean food spending at the start of the month (Figure 3A). According to the CSFII data, individuals in female-headed households do not experience a

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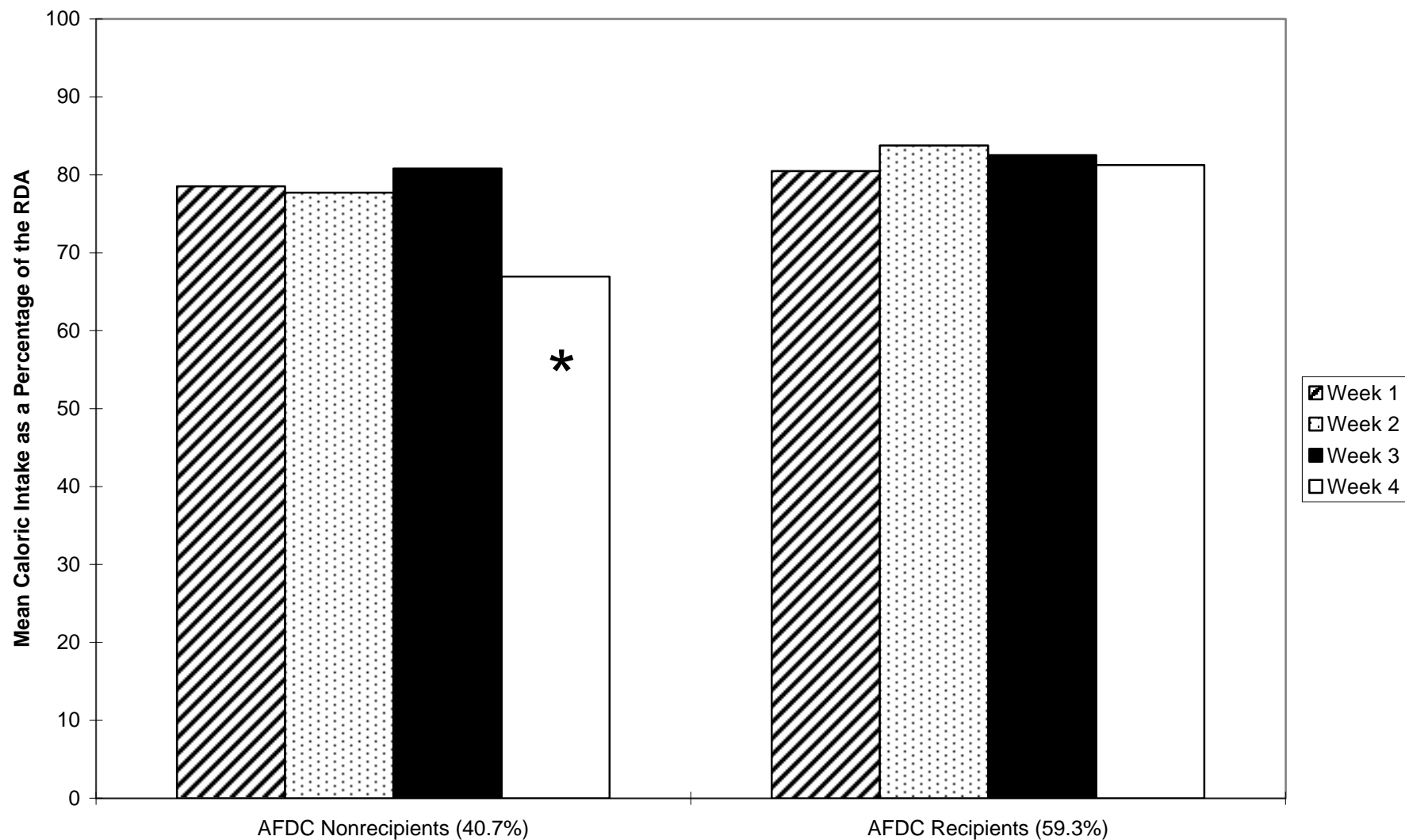
<sup>3</sup>In this figure, and in subsequent figures on food spending patterns, the column for Week 0 refers to the 7 days before food stamps are received. Week 1 is split into two columns so that the spike in mean food spending in Days 0–2 of the food stamp month may be distinguished from the lower food spending levels later that same week.

**Figure 2A**  
**Food Expenditure by Consumer Units, According to AFDC Receipt**



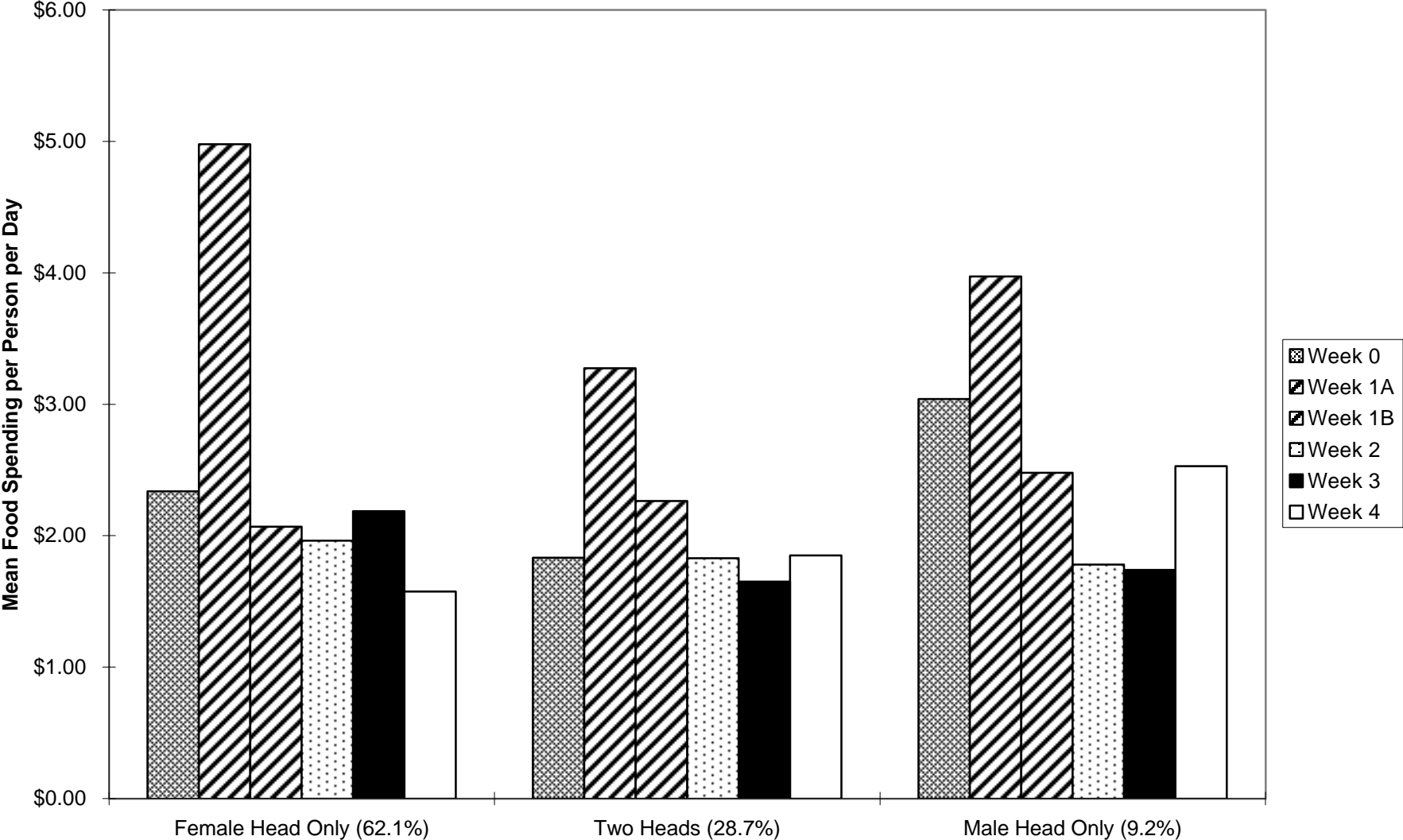
**Notes:** Week 0 is the 7 days before food stamps were received. Week 1A is Days 0–2 of the food stamp month. Week 1B is Days 3–6 of the food stamp month.

**Figure 2B**  
**Food Intake by Individuals, According to AFDC Receipt**



**Note:** \*Signifies Week 4 intake is significantly less than Week 1 intake ( $\alpha = .05$ , one-tailed test).

**Figure 3A**  
**Food Expenditure by Consumer Units, According to Household Headship**



**Notes:** Week 0 is the 7 days before food stamps were received. Week 1A is Days 0–2 of the food stamp month. Week 1B is Days 3–6 of the food stamp month.



dip in food intake at the end of the month (Figure 3B). Individuals in households headed by couples exhibit some drop in food intake at the end of the month, but because the sample size gets smaller as the data are broken down in such detail, this pattern could be due to sampling variation. Male-headed households appear to have the greatest fall in food intake at the end of the month.

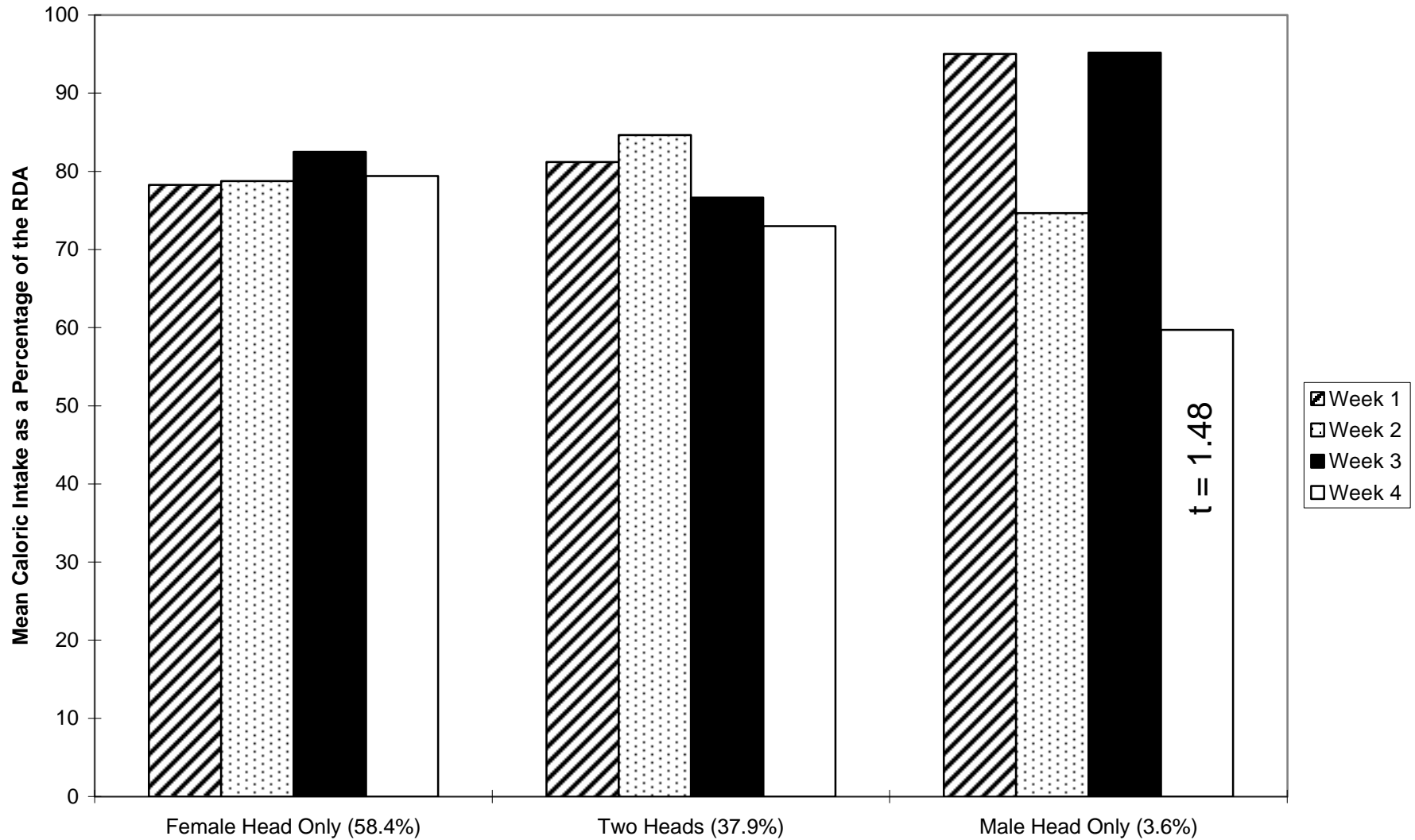
To sum up the findings on AFDC participation and household headship, the moderate dip in mean food energy intake at the end of the month (noted for the full sample in Figure 1B) is predominantly due to a larger fall in food intake for individuals in food stamp households that do not receive AFDC and are not headed by a single female. This pattern may indicate the direct effects of female headship and AFDC participation in reducing the amplitude of the monthly food intake cycle, or it may stem from the effects of other variables (such as participation in other social programs or access to other sources of low-cost food), which could be indirectly associated with female headship and welfare participation.

#### Expenditure and Intake, According to Shopping Frequency

Previous authors have noted that food stamp recipients tend to conduct grocery shopping trips infrequently, even by comparison to low-income nonrecipients (Fraker 1990; Blaylock 1989). One question in the CSFII asked how frequently households conducted “major” grocery shopping trips. In the CSFII sample, only 16 percent of low-income nonrecipient households (with incomes less than 130 percent of the poverty line) reported conducting such trips once per month or less frequently. By comparison, 42 percent of food stamp households shop this infrequently. In what follows, a household is said to shop “seldom” if it conducts major grocery trips once per month or less frequently, and it is said to shop “often” otherwise.

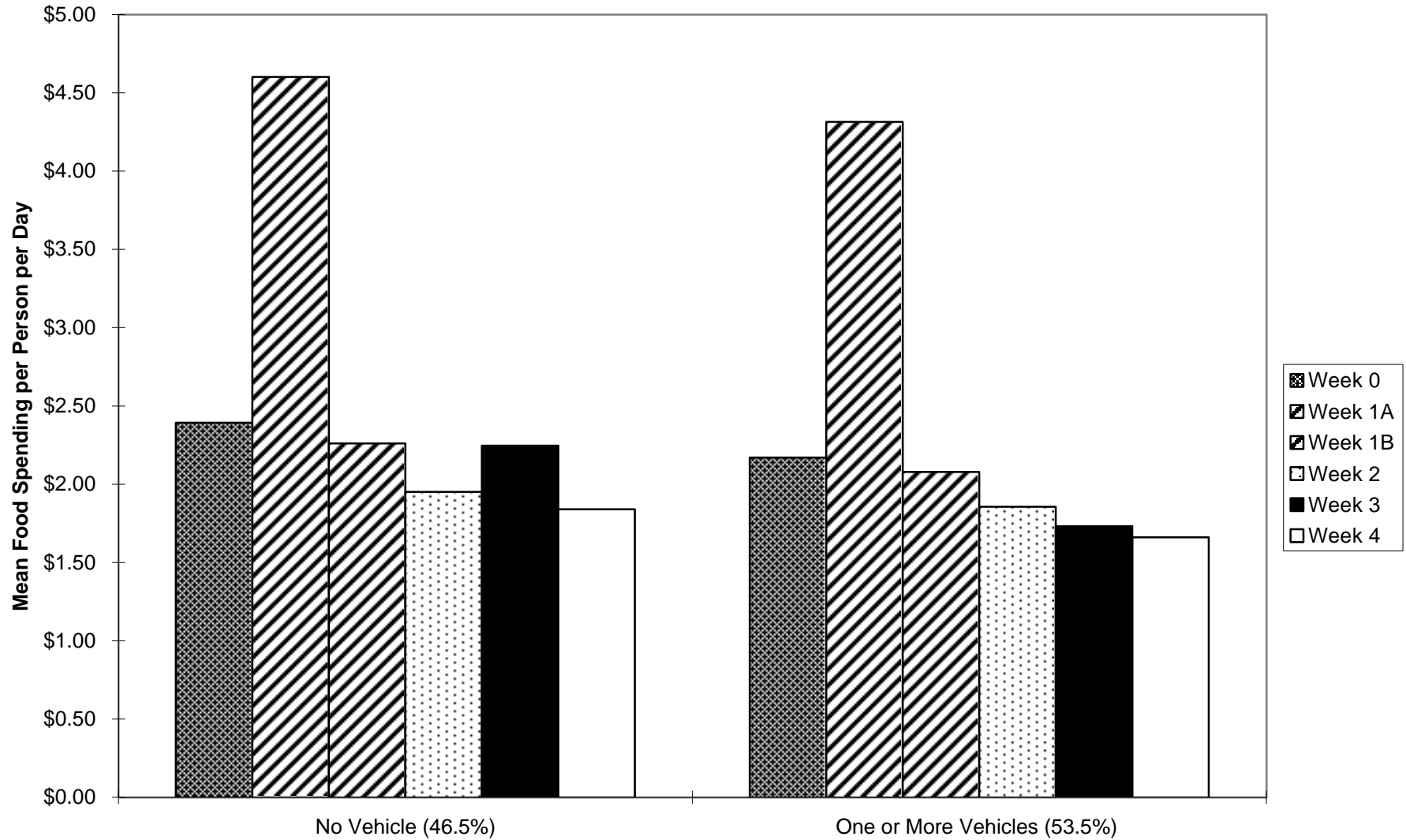
The spending patterns for households that own or do not own automobiles are described in Figure 4A, and the food intake patterns for individuals in families that shop “often” or “seldom” are

**Figure 3B**  
**Food Intake by Individuals, According to Household Headship**



**Note:** The  $t$ -statistic is for a one-tailed test of the difference between Week 4 intake and Week 1 intake.

**Figure 4A**  
**Food Expenditure by Consumer Units, According to Vehicle Ownership**



**Notes:** Week 0 is the 7 days before food stamps were received. Week 1A is Days 0–2 of the food stamp month. Week 1B is Days 3–6 of the food stamp month.

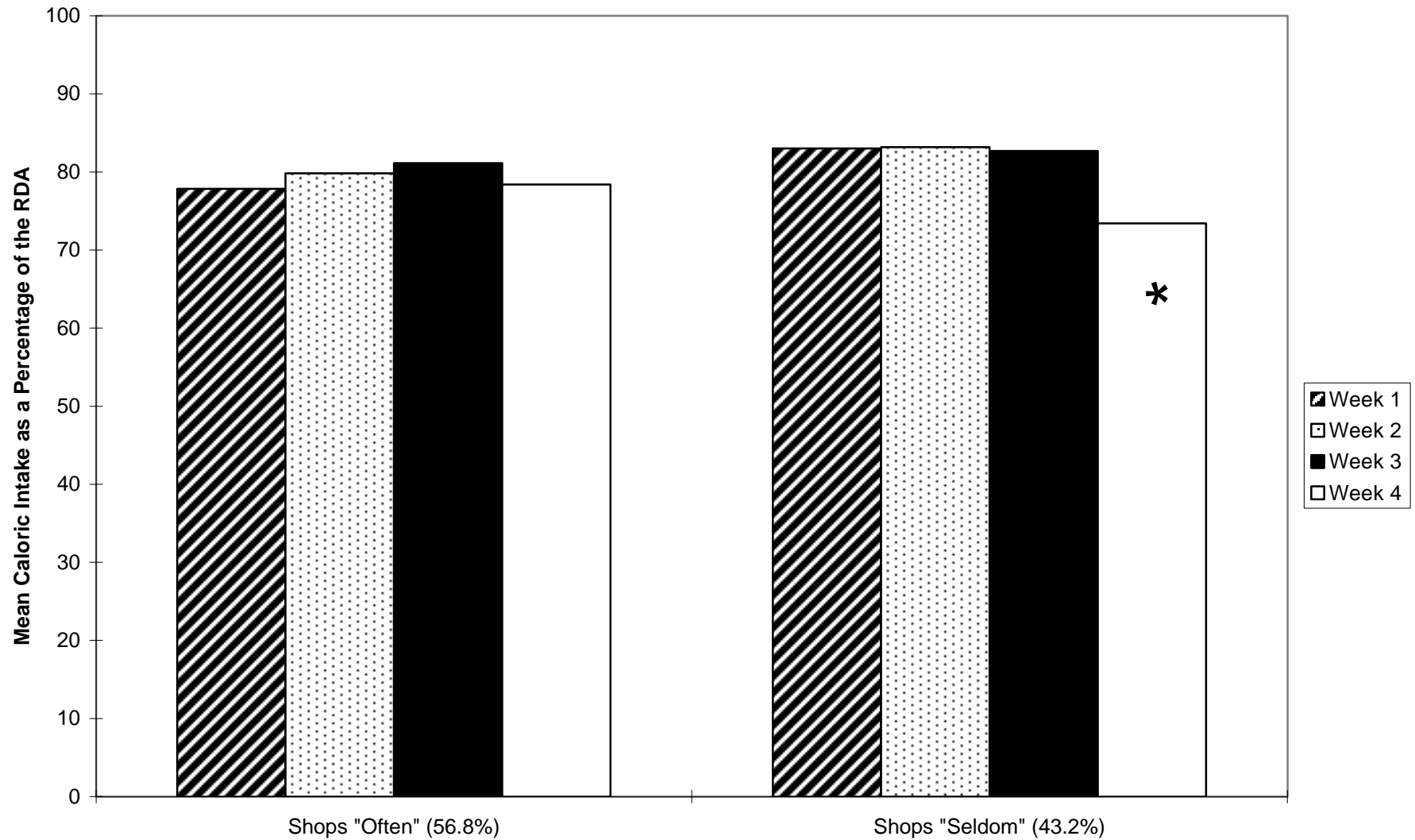
described in Figure 4B. The distinctive shopping behavior for food stamp households is interesting, because individuals in households that shop “seldom” have a significant drop in food energy intake during the last week of the food stamp month, while individuals in households that shop “often” have smooth food intake over the whole period (Figure 4B). The direction of causation for this relationship between food shopping and food intake is not obvious. Households that face transportation difficulties or time constraints may shop only once a month, and they may have trouble storing food for consumption 4 weeks later as a consequence (although Figure 4A shows a sharp spending cycle even for households with cars). Or, as the quotation from the *New York Times Magazine* in the introduction suggests, some households may experience low food intake at the end of the month because they find it difficult to save their food stamp resources so long. Lacking resources with which to shop, there would be little reason to conduct a second “major” grocery trip in the second half of the month, even if shopping costs were negligible. To shed light on this issue, Section IV below investigates how food intake of perishable and nonperishable foods differs for recipients who shop “often” or “seldom.”

#### Expenditure and Intake for Families with Children

A cyclical drop in food intake for children would be especially worrisome for several reasons. In extreme cases, periodic nutritional deprivation can stunt growth and development in children. Also, nutritionists and other researchers have identified changes in children’s meals as a symptom of the most severe categories of household food insecurity (Food and Consumer Service 1994). Finally, in the rhetoric of U.S. public policy debates, children are held blameless for household food decisions while adults are often held responsible if they fail to acquire or save adequate food resources for themselves.

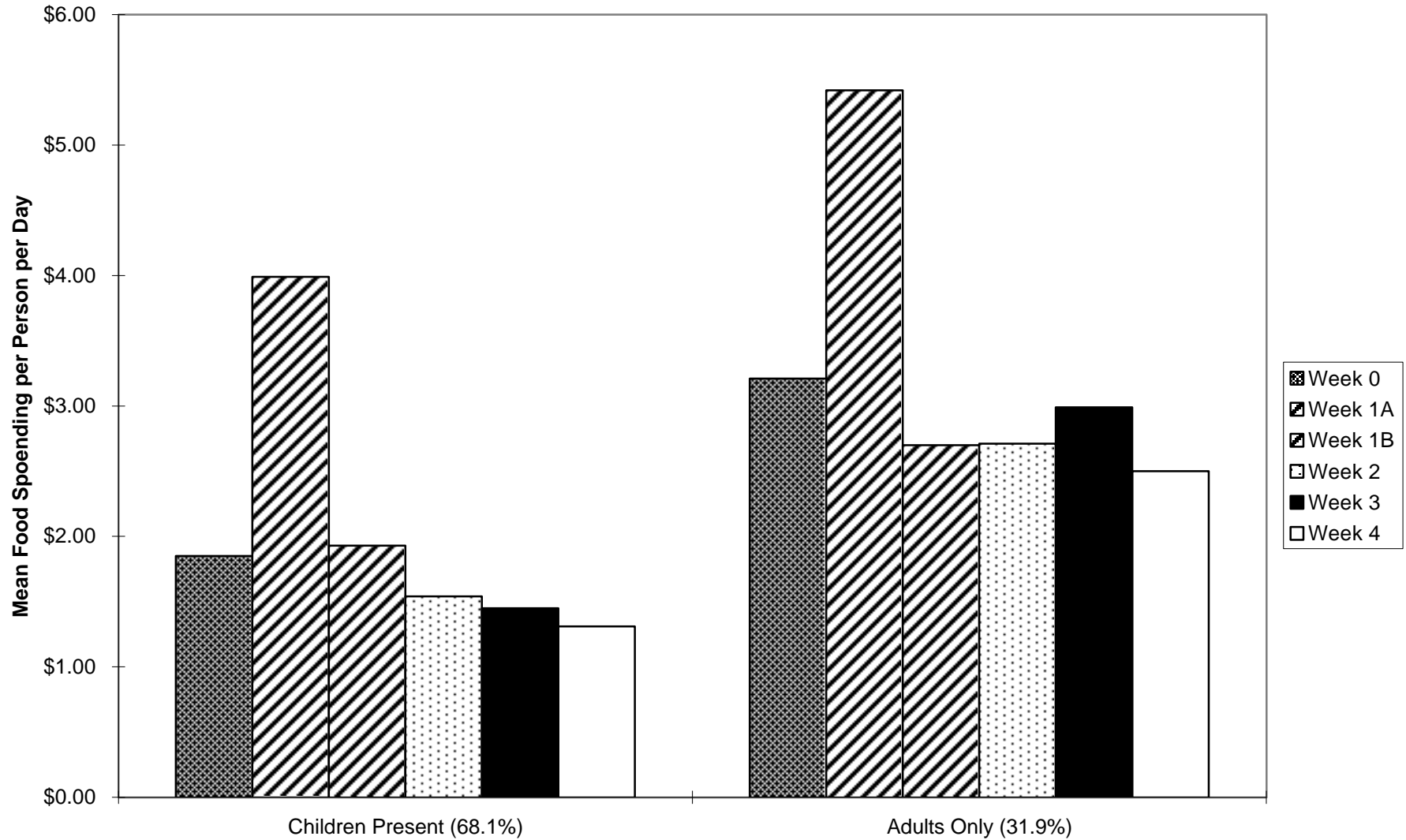
There is little difference in the amplitude of the spending cycle for families with and without children under age 18 (Figure 5A). Food expenditure per person is lower for families with children because children consume less food than adults in absolute terms (teenagers excepted), so this difference

**Figure 4B**  
**Food Intake by Individuals, According to Shopping Frequency**



**Note:** \*Signifies Week 4 intake is significantly less than Week 1 intake ( $\alpha = .05$ , one-tailed test).

**Figure 5A**  
**Food Expenditure by Consumer Units, According to Presence of Children**



**Notes:** Week 0 is the 7 days before food stamps were received. Week 1A is Days 0–2 of the food stamp month. Week 1B is Days 3–6 of the food stamp month.

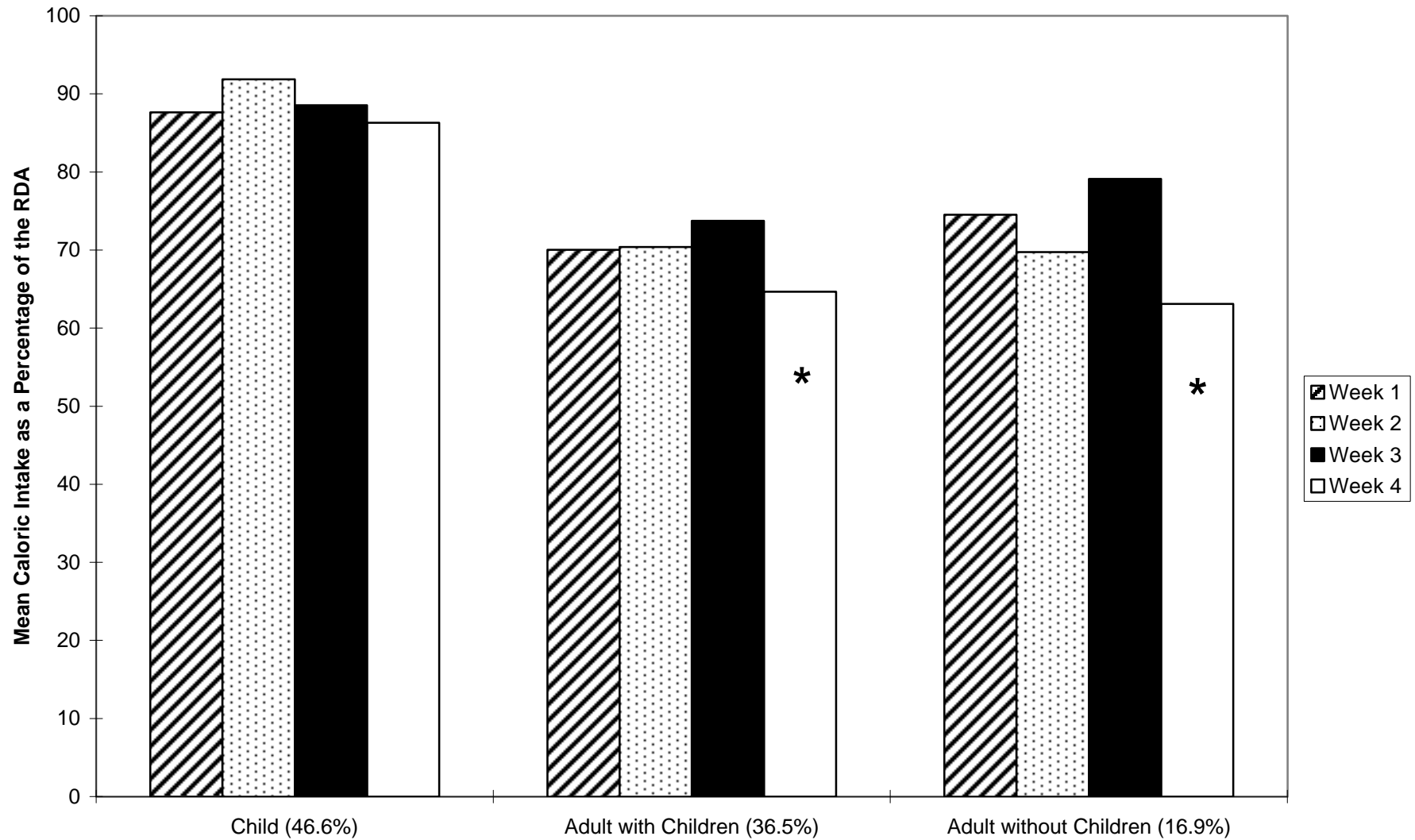
does not indicate less adequate food supplies for households with children. In contrast with the expenditure cycle, mean food energy intake is quite different for children and adults (Figure 5B). Adults absorb almost the full drop in food intake, and for them Week 4 intake is significantly less than Week 1 intake. For children, food intake on average remains quite constant over the food stamp month. Children also have higher food energy intake relative to the RDA for their sex and age, indicating that the difference in the RDAs for children and adults is greater than the difference in their actual intake. Relative to the RDAs, children have higher reported food energy intake as well as a smoother intake pattern over the food stamp month.

This food intake pattern could potentially reflect the reluctance of adults to admit in a household survey that they have allowed children in the household to go hungry, but it seems plausible that this pattern reflects a real difference in the food intake of children and adults. Low-income households may be careful to protect children from declines in food intake at the end of the month. Also, this pattern may indicate the effectiveness of school meal programs, which serve children but not adults.

#### IV. EXPENDITURE AND INTAKE FOR SELECTED FOODS AND NUTRIENTS

Different foods may exhibit different monthly cycles for at least two reasons: some foods are more perishable than others, and some foods are more expensive than others. This section discusses monthly cycles for different foods in three ways. First, it considers 19 detailed categories of food expenditure. Second, it compares food expenditure to food intake using six more highly aggregated food categories from the Food Guide Pyramid (U.S. Department of Agriculture 1992). Third, it measures monthly cycles in intakes for particular macronutrients and micronutrients of nutritional concern.

**Figure 5B**  
**Food Intake by Individuals, for Children and Adults**



**Note:** \*Signifies Week 4 intake is significantly less than Week 1 intake ( $\alpha = .05$ , one-tailed test).



### Food Expenditure, by Detailed Food Category

The expenditure data employ hundreds of UPC codes for specific items purchased. The codes for food at home are organized into 18 categories in the public data files, and there is also a category for food away from home. To illuminate differences in the monthly spending cycle for different foods, Week 4 expenditure is measured for each category as a proportion of Week 1 expenditure (Figure 6). This scale shows the degree to which expenditure drops off over the course of the food stamp month for different foods.

Consider the seven foods for which the relative drop in spending from Week 1 to Week 4 is greatest (at the bottom of Figure 6). These foods include some low-cost nonperishables, such as canned vegetables and cereals, which are saved for use throughout the month. These foods also include some high-cost items, such as ice cream and seafood, which are probably luxuries consumed mainly at the start of the food stamp month. By contrast, most foods that are highly perishable are purchased more evenly over the month. For example, fresh fruit and fresh vegetables are purchased more steadily over the month than processed fruit and processed vegetables. Milk and food away from home, which is perishable in the sense that it is generally eaten on the spot, are consumed most smoothly over the month.

### Expenditure and Intake, According to the “Food Guide Pyramid”

To compare expenditure and intake patterns, foods are also organized into six broader categories that approximately represent the cells of the federal government’s well-known Food Guide Pyramid (Figure 7), which reflects consensus recommendations regarding the composition of a healthy diet. Existing food categories in the public data files are employed as much as possible, although fresh and processed vegetable expenditures are combined to create the category VEG, and sweets and oils are combined to create the category SWTOIL, which is the small triangle at the top of the pyramid. A disadvantage of combining foods into the “pyramid” food categories is that relevant details, such as the

**Figure 6**  
**Expenditure by Consumer Units at End of Month,**  
**for 19 Detailed Food Categories**

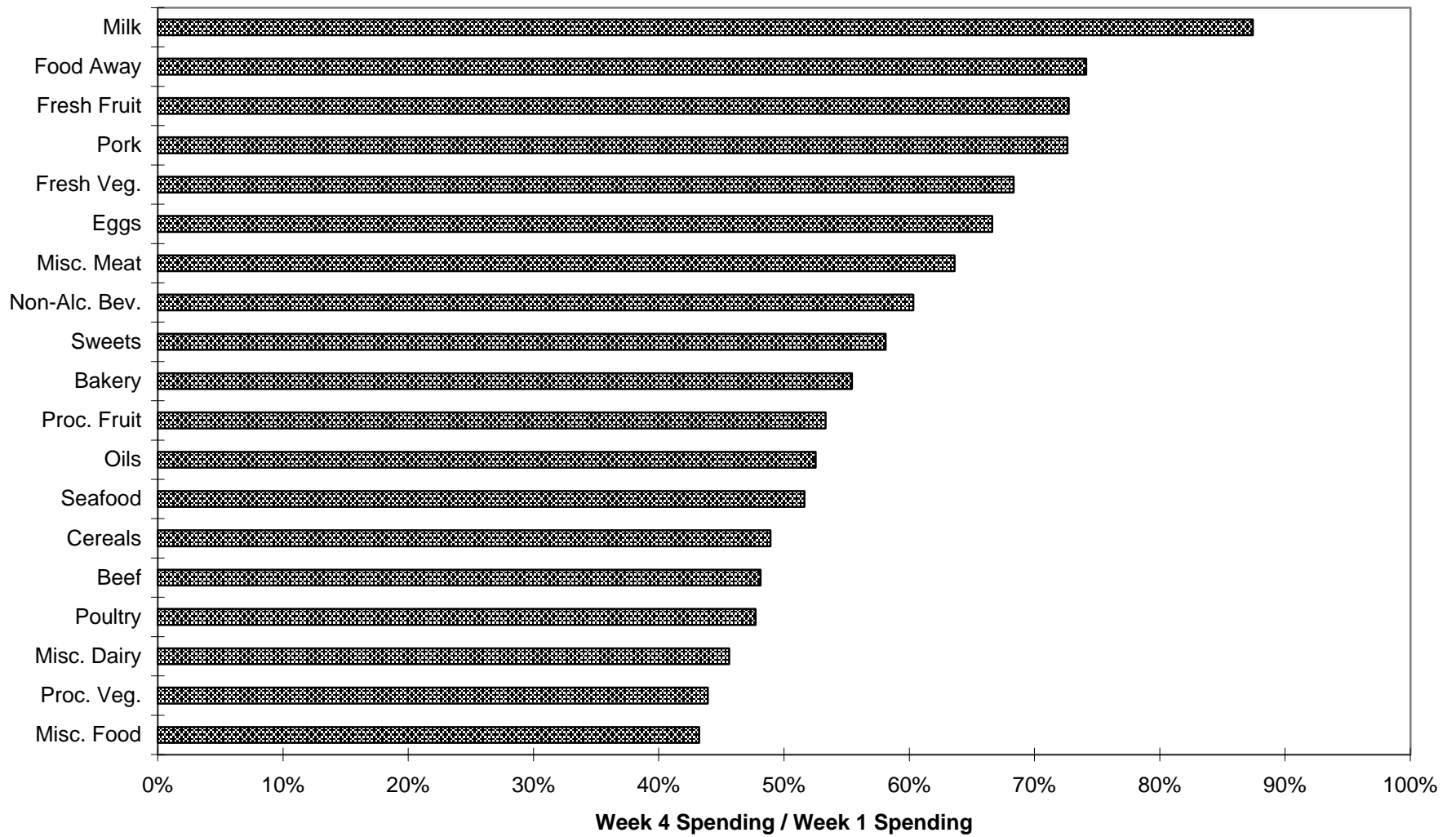
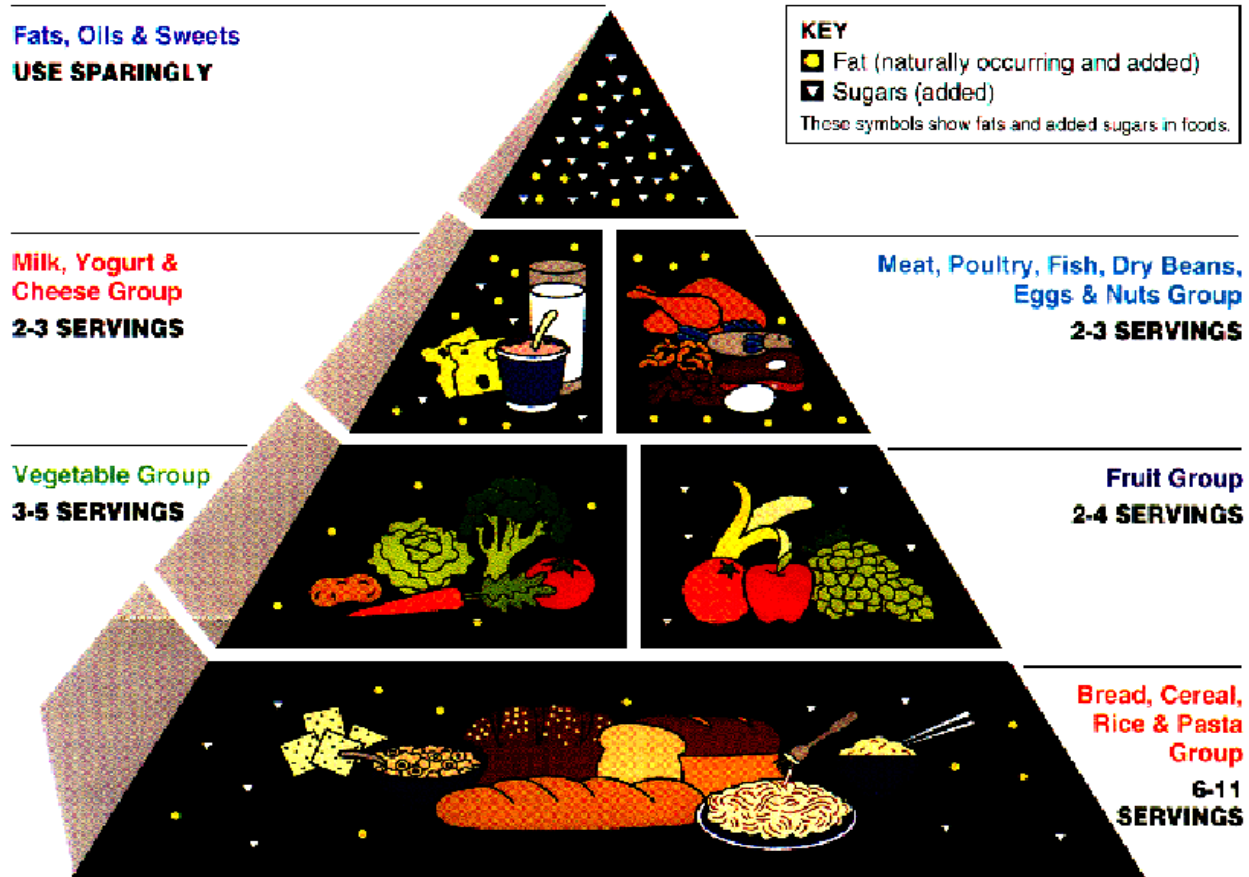


Figure 7  
Food Guide Pyramid



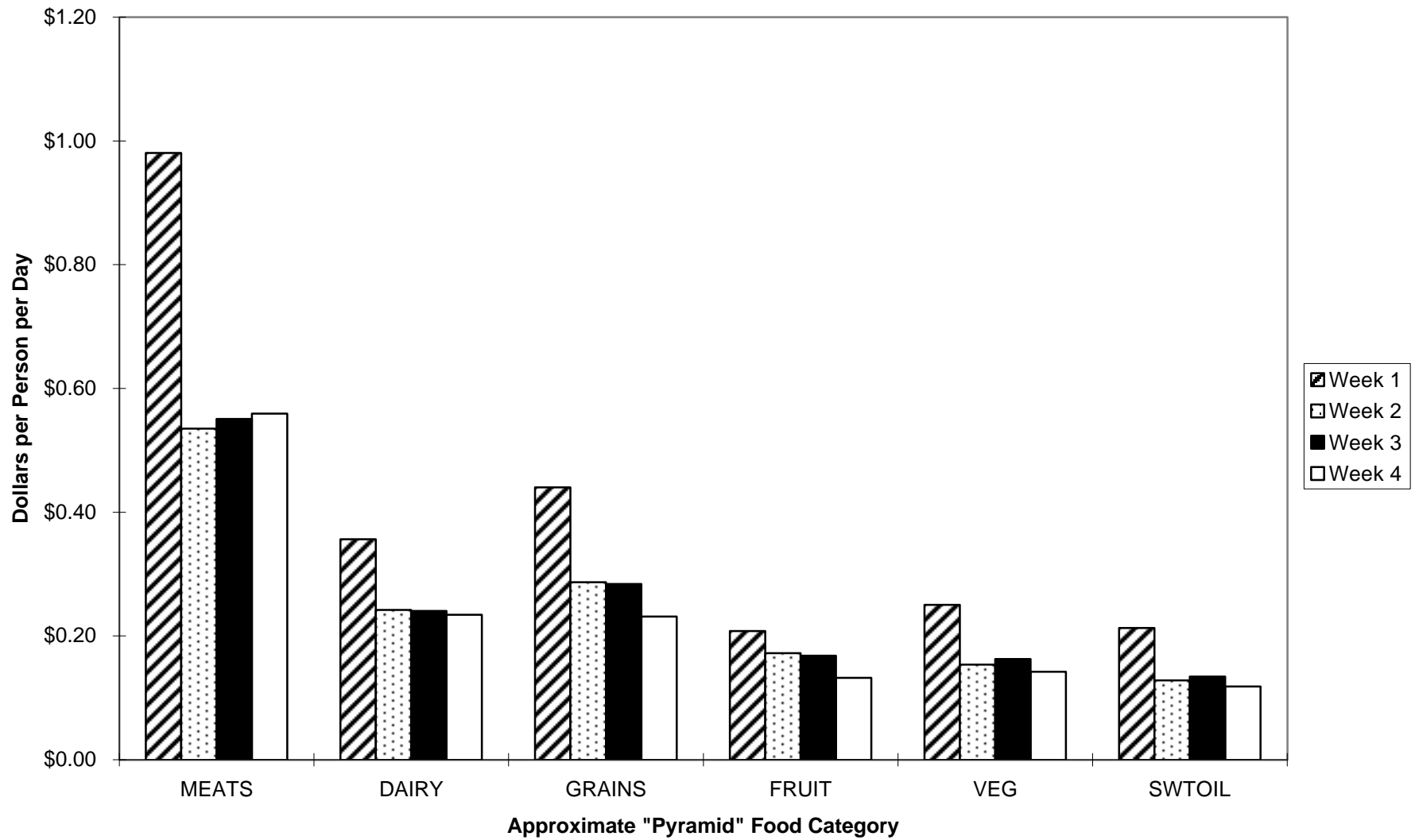
difference between processed and fresh vegetables, are hidden. An advantage is that the nutritional implications of the food stamp cycle can be assessed using a small and easily comprehended set of well-known food categories.

Meats constitute a high proportion of both food expenditure and food intake (Figures 8A and 8B). Dairy products make up a higher proportion of food intake than they do of food expenditure, in part because the intake variables for specific food categories are measured by weight including water. Fruits and vegetables make up a small proportion of both expenditure and intake, in comparison with the recommended amounts. The most consumed item in the FRUIT category is fruit juices, and the most consumed items in the VEG category are potatoes and tomatoes.

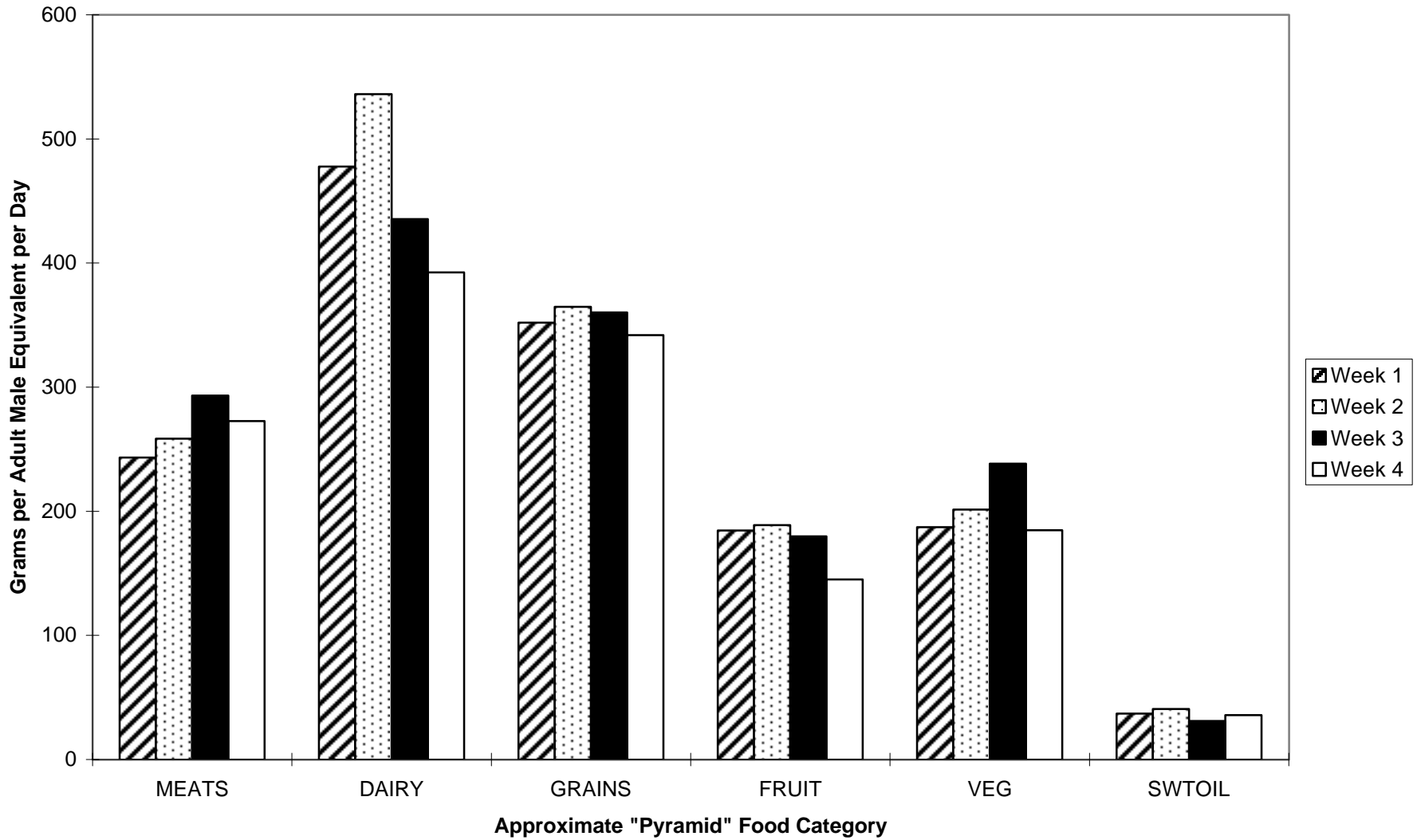
It is easier to perceive relative differences in the monthly expenditure and intake cycles when the variables are expressed as the ratio of Week 4 values to the corresponding values in Week 1 (Figures 9A and 9B). As one might expect from the more detailed discussion of different food expenditures above (Figure 6), food expenditures are much lower at the end of the month for all “pyramid” food categories than they are at the start. The drop is greatest for GRAINS, which consists mainly of nonperishable foods that are easily purchased at the start of the month for consumption later.

As for food intake, households that shop “often”—more than once a month—experience no drop in food intake at the end of the month (see Section III above). Even for households that shop “seldom,” the drop in food intake is concentrated almost entirely in relatively perishable food categories: dairy and fruits. For these two categories, the apparent drop at the end of the month is too great to be explained by sampling variation. The comparatively steady intake of meat over the food stamp month is surprising, since even after accounting for low-cost items such as hot dogs, one might expect meat to be a relative luxury that is consumed less frequently at the end of the month. The observed pattern does not corroborate anecdotal reports, for example in the *New York Times Magazine* quotation in the introduction, that only starchy staples are available late in the month. Also, while these intake results

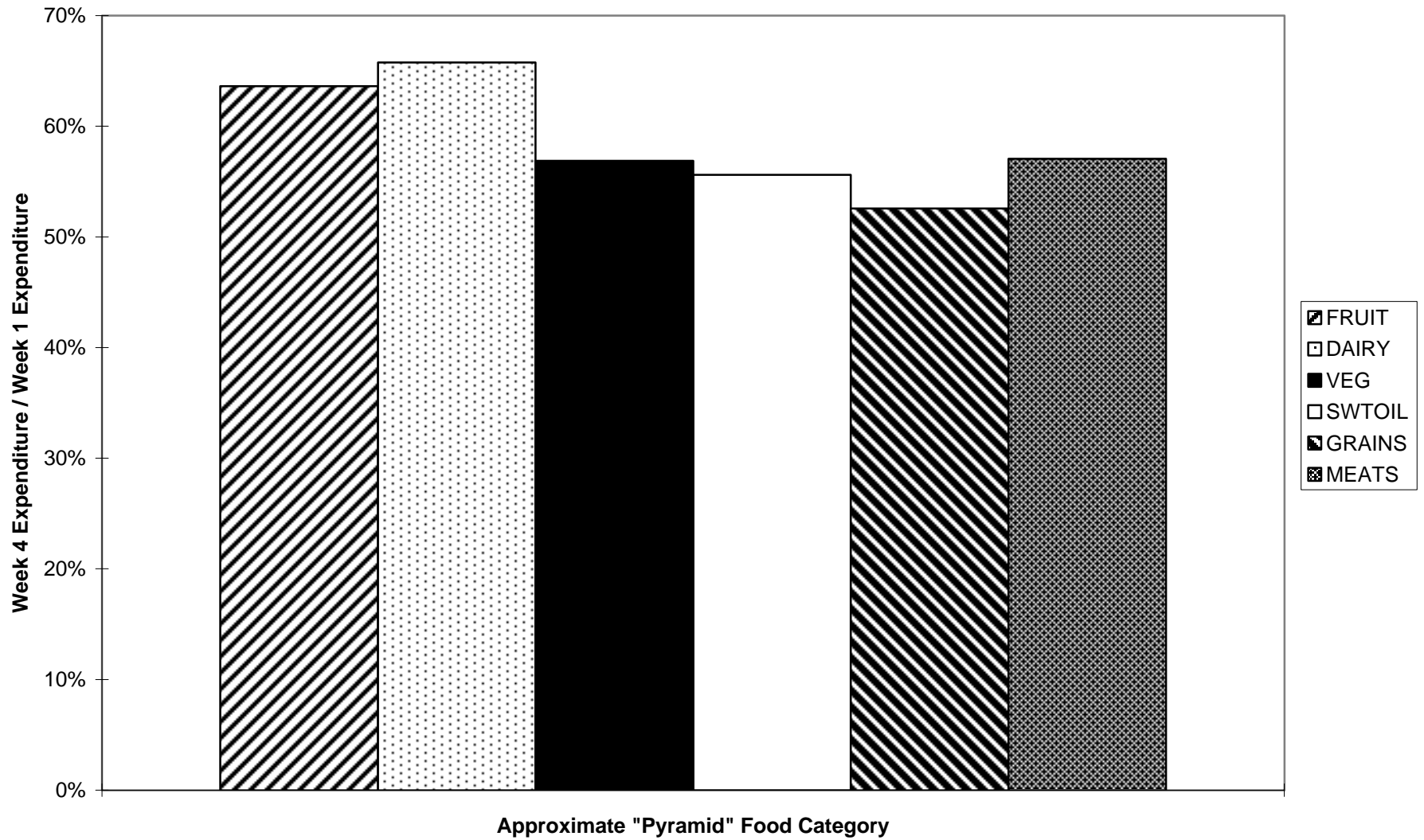
**Figure 8A**  
**Expenditure by Consumer Units, for Pyramid Food Categories**



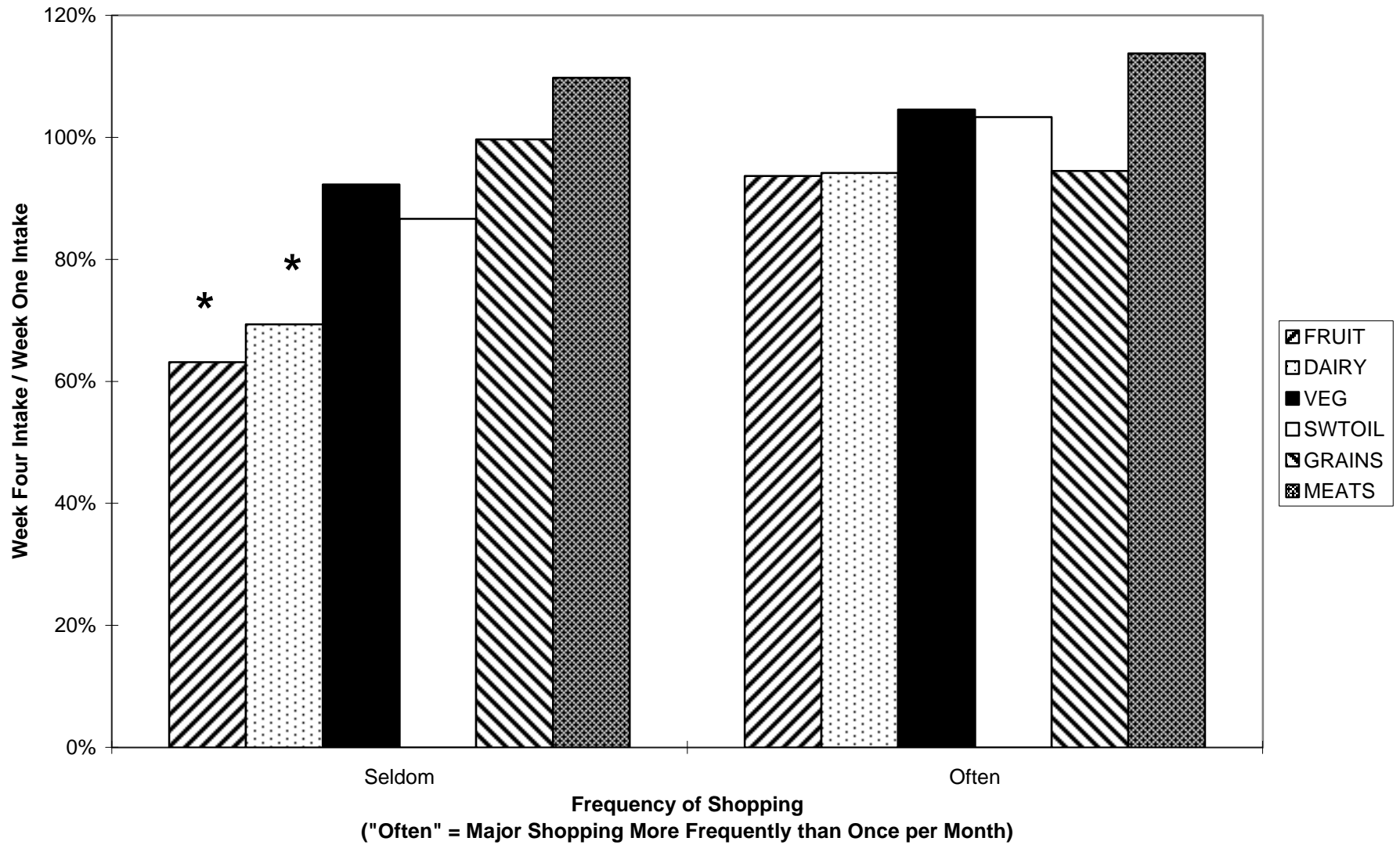
**Figure 8B**  
**Food Intake by Individuals, for Pyramid Food Categories**



**Figure 9A**  
**Expenditure by Consumer Units at End of Month, for Pyramid Food Categories**



**Figure 9B**  
**Intake by Individuals at End of Month, for Pyramid Food Categories**





otherwise correspond very closely to those found by Emmons (1986) in her Cleveland sample, she found a significant drop in the consumption of “high-protein foods” in Week 4. In the CSFII sample, by contrast, the key feature of foods that are consumed less at the end of the month appears to be their perishability.

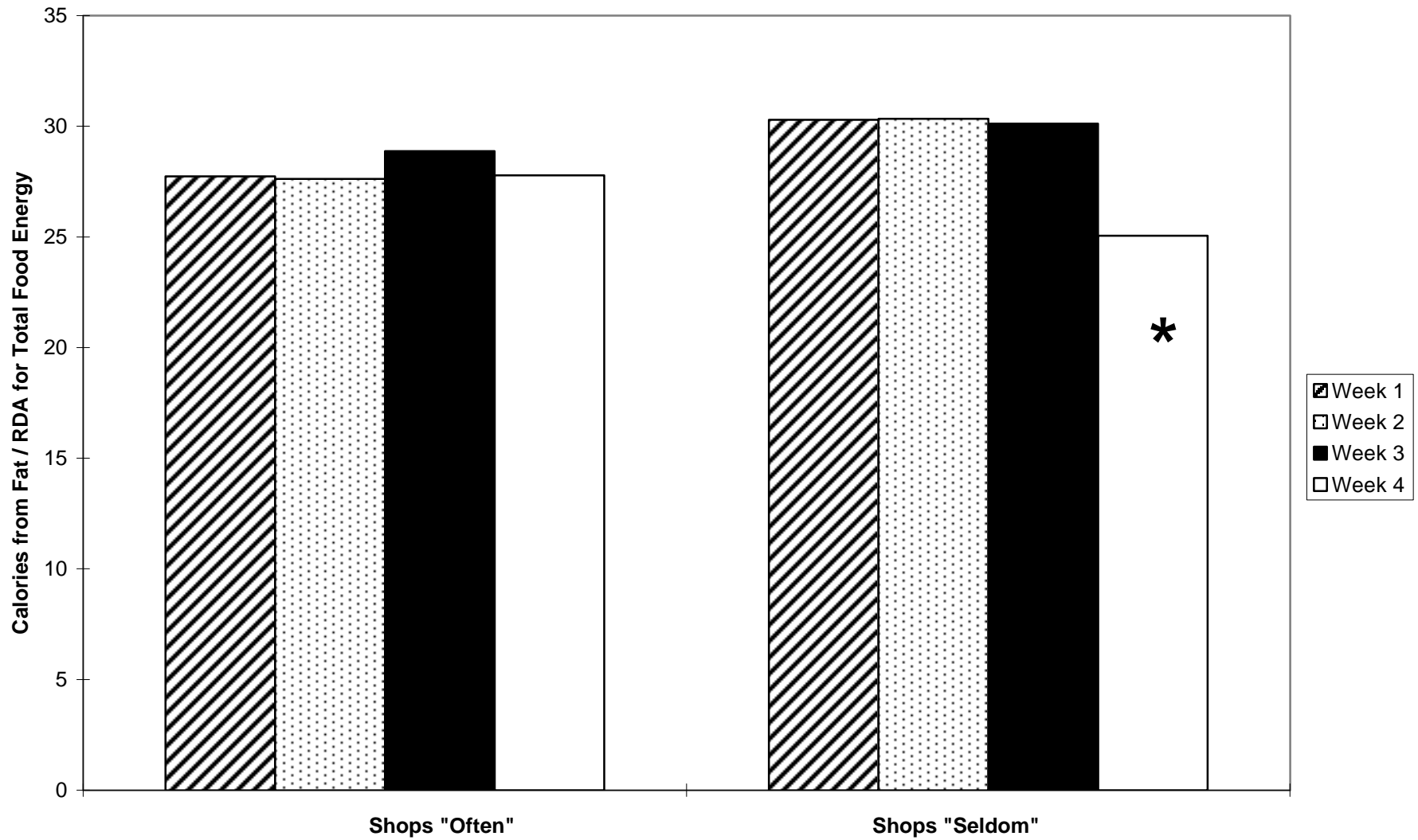
### Macronutrients and Micronutrients

This section closes with a look at selected macronutrients and micronutrients. Food stamp recipients in the CSFII sample receive 35 percent of their calories from fat on average, which is about the same proportion that all CSFII respondents receive (34.4 percent) and greater than the maximum of 30 percent that is generally recommended. For recipients who shop “seldom,” fat intake drops significantly in Week 4 (Figure 10). However, that fall mainly reflects the fall in all sources of calories for these recipients. The share of their calories that come from fat does not drop as steeply (Figure 11). Instead, it appears that the share of food energy from each of the major macronutrients—fats, carbohydrates, and proteins—remains relatively steady even as total caloric intake falls at the end of the month.

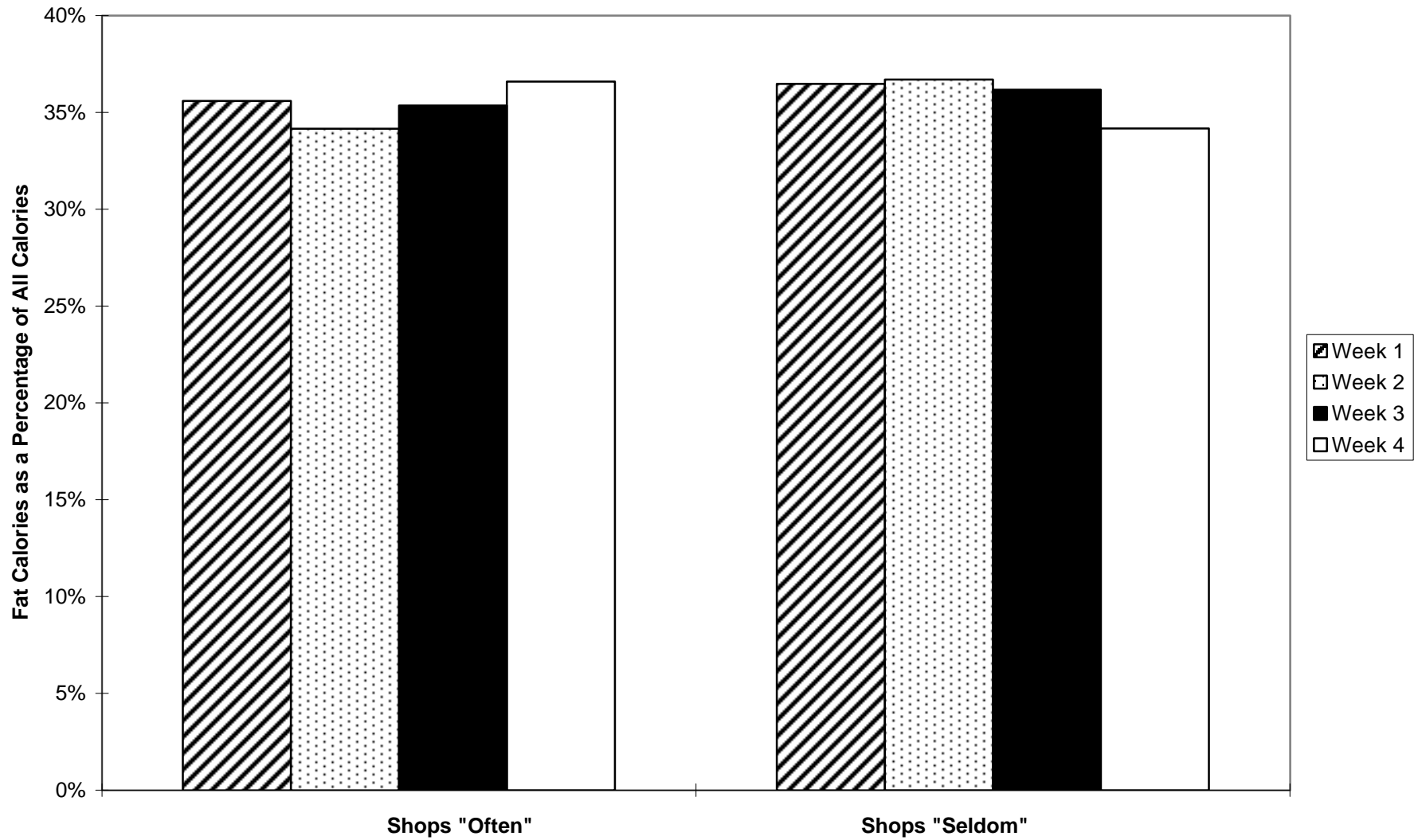
Seven micronutrients (vitamins and minerals) are investigated here. These seven are mentioned as “concerns for low-income, high-risk populations” in the *Third Report on Nutrition Monitoring in the United States* (Federation of American Societies for Experimental Biology 1995): vitamin A, vitamin C, vitamin B6, folate, calcium, iron, and zinc. Iron and calcium are also highlighted in *The Surgeon General’s Report on Nutrition and Health* (U.S. Department of Health and Human Services 1988) as special concerns for some people.

The seven micronutrients are measured as a proportion of the corresponding RDA for each nutrient (Figure 12). The RDAs for micronutrients, unlike the RDA for food energy discussed above, are not recommendations for the typical or median consumer, but higher and more conservative levels that are designed to ensure that almost all consumers who achieve the RDA will be free of symptoms of

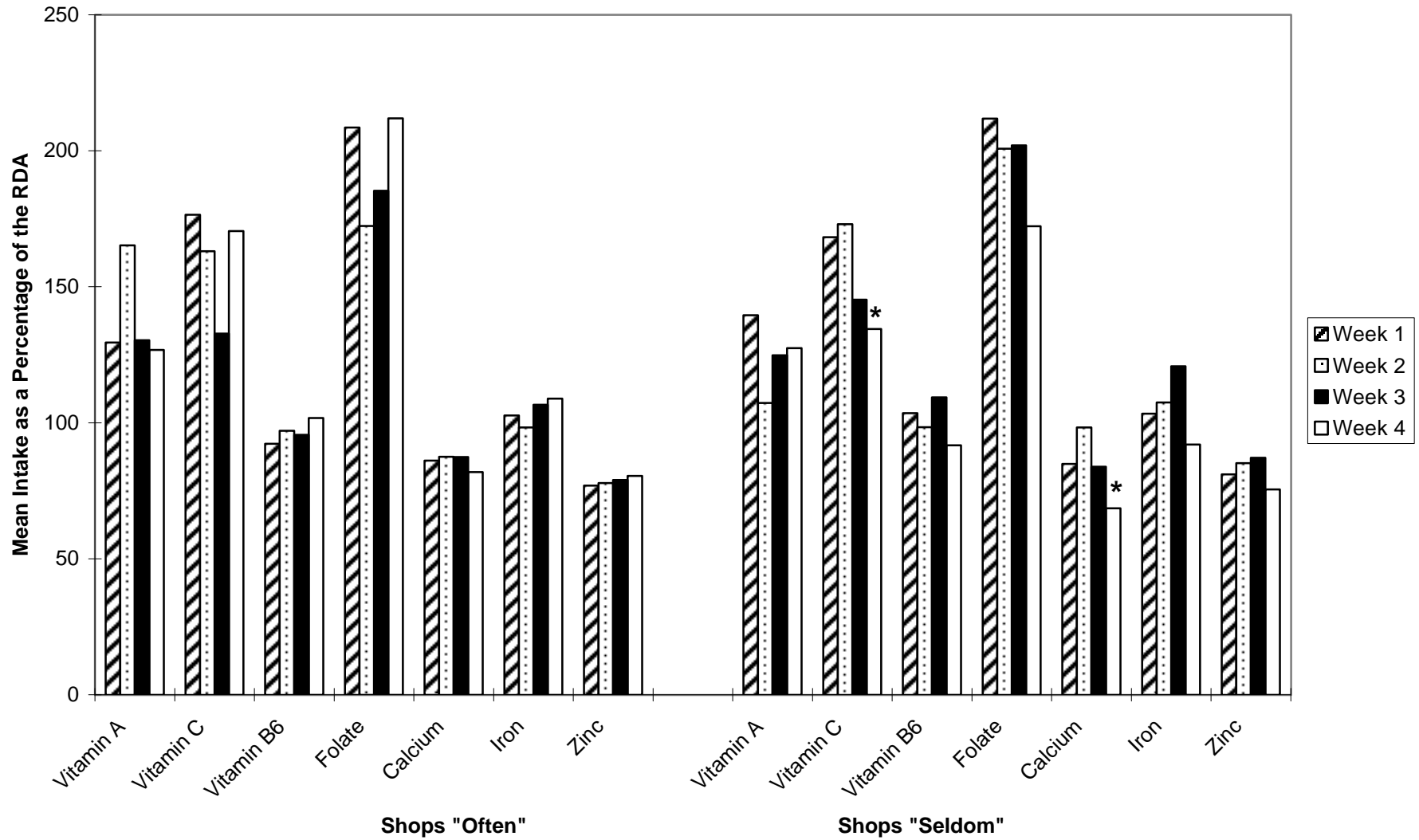
**Figure 10**  
**Fat Intake by Individuals, According to Shopping Frequency**



**Figure 11**  
**Proportion of Calories from Fat, According to Shopping Frequency**



**Figure 12**  
**Intake by Individuals, Selected Micronutrients**



deficiency. For the CSFII sample of food stamp recipients, the lowest intakes relative to the RDA occurred for vitamin B6 (98 percent), calcium (85 percent), iron (104 percent), and zinc (80 percent). Due to the underreporting of total food intake suspected in the CSFII, these estimates are probably biased downward.

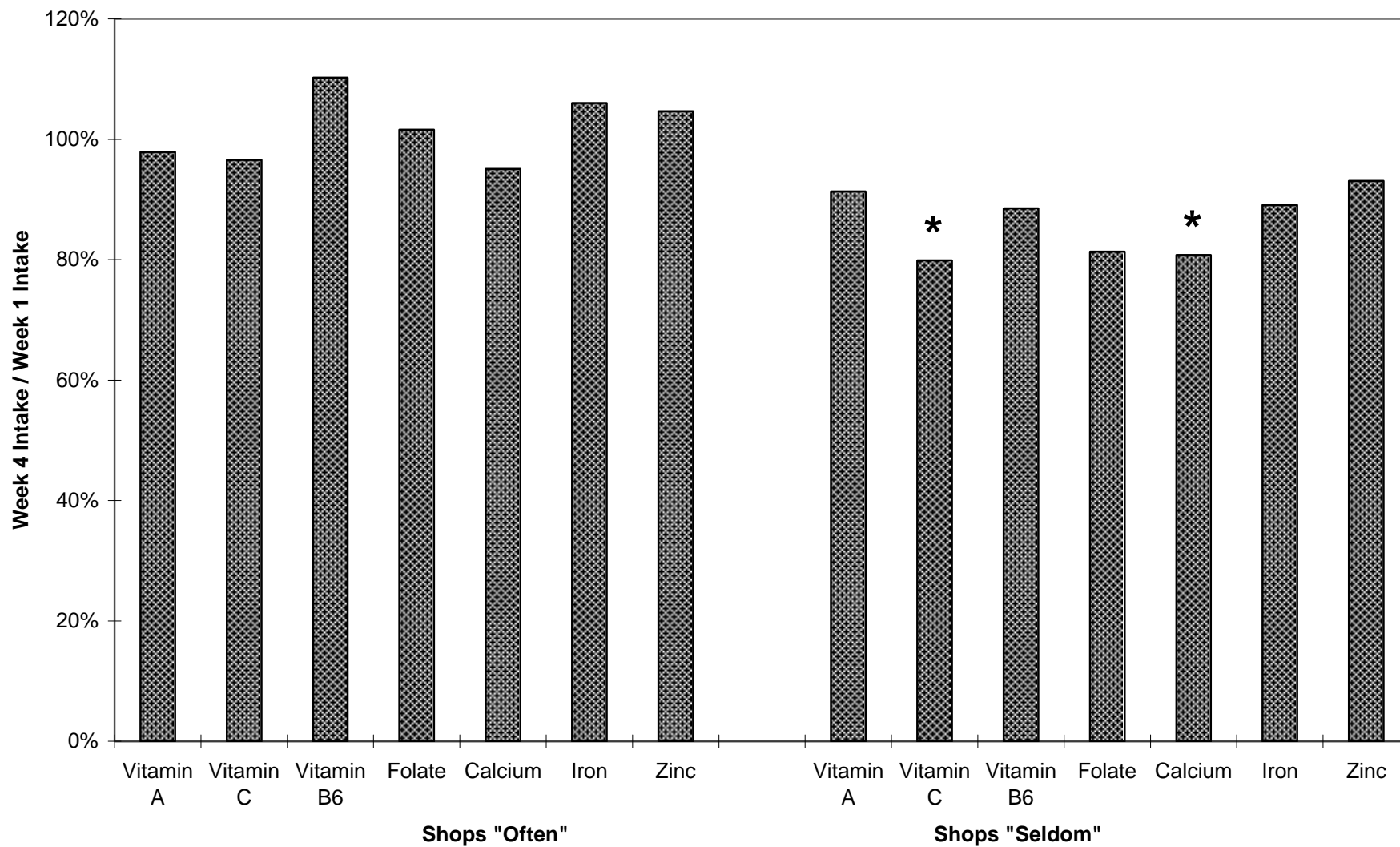
Once again, it is easier to perceive relative differences in the monthly cycle for these micronutrients when their intake is measured as the ratio of Week 4 intake to Week 1 intake (Figure 13). As with the pattern in specific foods, there is little or no drop in intake at the end of the month for those recipients who shop “often,” while for some nutrients there is a significant drop for those who shop “seldom.” In particular, intake of vitamin C and calcium is significantly lower at the end of the month for these recipients. Calcium is the only micronutrient whose consumption was both lower than the RDA on average and also significantly lower at the end of the food stamp month.

## V. CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The most direct policy implication of this research is that food spending and intake patterns might be smoother if food stamp benefits were delivered twice monthly. In this section, we consider advantages and disadvantages of this potential program change, but make no recommendation. This study also could have implications for the evaluation of electronic benefit transfer (EBT) and for nutrition education.

At present, the more important implications of this research are indirect. Later in this section, we consider implications of this research for investigations of food insecurity and of the impact of the Food Stamp Program. We close with suggestions for future work.

**Figure 13**  
**Intake by Individuals at End of Month, Selected Micronutrients**



### Delivering Food Stamp Benefits Twice Monthly

From this research, it appears that delivering food stamp benefits twice monthly would greatly smooth food expenditure patterns over the food stamp month. It also could help recipients smooth their food intake over the month, especially for two perishable food categories: dairy and fruits. Perhaps surprisingly, this change was recommended by some food stamp recipients themselves, in focus group discussions conducted as part of the San Diego cash-out experiment (Ohls et al. 1992). Depending on the cause of the current dip in food intake at the end of the month, this program change might also slightly increase the overall impact of the Food Stamp Program on monthly food consumption.

There are also disadvantages to delivering food stamp benefits twice monthly. Recipients who currently shop once a month may be optimizing their welfare as well as they can, given financial constraints and the costs of shopping. A program change designed to encourage more frequent “major” shopping trips may impose more costs than benefits on these recipients. Even recipients whose food intake cycle results from splurging at the start of the month may not be better off with a smoother consumption path. As we discuss below, in suggestions for further research, the wisdom of overriding consumer preferences in this case depends on the nutritional harm sustained during occasional periods of low food intake, which is not yet well understood. We do know that children, whose nutritional welfare might otherwise provide the strongest rationale for overriding adults’ revealed preferences, already appear to be somewhat protected from the monthly food intake cycle.

The increased administrative costs of delivering benefits twice monthly are likely to be substantial under the current system of paper food stamp coupons, but perhaps lower with EBT, a new debit card system for administering food stamp benefits. Twenty-nine states already have an operational EBT system in some part of the state, and 17 states have statewide systems. A recent evaluation of the first statewide EBT system, in Maryland, compared the administrative costs of paper and EBT benefits for the Food Stamp Program and several other social welfare programs (Logan et al. 1994). The costs

were disaggregated and attributed separately to each step of the certification and issuance process. For the Food Stamp Program, the total operating costs were \$3.92 per case month under EBT and \$4.71 per case month under paper benefits. It is not possible to identify precisely the costs that would be incurred by delivering benefits twice monthly, but the approximate magnitude of these costs may be seen in the disaggregated estimates for three tasks: “create and post benefit records,” “process transactions,” and “resolve transaction problems.” The sum of costs for these three tasks is \$1.72 per case month under EBT and \$3.32 per case month under paper coupons. This evaluation does suggest that more frequent benefit delivery would be relatively expensive under the current paper benefit system but substantially less expensive under EBT.

A less paternalistic alternative to more frequent benefit delivery would be nutrition education focused on shopping patterns. An implication of this research is that intake of fruits and dairy products might be increased, in Week 4 and perhaps overall, if more recipients saved food stamps voluntarily for at least a second major shopping trip each month. A nutrition education effort emphasizing more frequent shopping might be an easier “sell” than a program that encourages recipients directly to consume more fresh fruit, for example. The federal government’s guidance for nutrition educators to use in teaching about the federal government’s new Food Guide Pyramid does not make a direct recommendation about shopping frequency. It does suggest that households should plan meals for several days at once, and it suggest *less* frequent grocery shopping as one advantage of such planning, but there is no indication that this literature intends to encourage grocery shopping as infrequently as once per month (Shaw et al. 1995).

#### Implications for Research on Food Insecurity

Most discussion of hunger and food insecurity in the nutrition and public health literatures could incorporate more detailed consideration of the food stamp cycle without much difficulty. Some survey



questions that are employed to assess food insecurity already appear robust to these considerations. The “USDA food sufficiency question” that has appeared in several national surveys refers to the 2 months prior to the interview and asks whether household members generally have “enough and the kind of food we want to eat,” etc. The Radimer/Cornell hunger and food insecurity questions even seem to take as given a pattern of plenty followed by scarcity. For example, they ask respondents whether it is often true that “the food that I bought just didn’t last, and I didn’t have money to get more” (Food and Consumer Service 1994). Because the reference period for these survey questions is sufficiently broad, the food stamp cycle does not cause mismeasurement.

The food stamp cycle causes more trouble for nutritional assessments that depend on short periods of survey information, such as one day or several days. For example, in a study of low-income women in Upstate New York, Kendall, Olson, and Frongillo (1996) did not find expected associations between some food intake measures and food security status. They suspected this result occurred because “food intakes were not captured at distinct points in time when households were expected to be most food insecure.” This problem could be addressed either by explicitly accounting for the monthly cycle or simply with a larger random sample.

#### Implications for Research on the Food Stamp Program

Fraker (1990) mentioned that systematic variation in food shopping at different times of the month might cause problems for research using expenditure survey data that were collected with a diary methodology, such as the Diary CEX. Many regression analyses of food spending as a function of food stamp benefits, reviewed by Fraker, have used this type of data. “While such variation has no effect on the sample mean of the diary measure of food purchases, it increases the standard error of the mean, thus making it more difficult to obtain statistically significant estimates of the effects of food stamps on food purchases,” Fraker cautioned.

As noted above, this problem has also been encountered using diary intake data (Kendall, Olson, and Frongillo 1996), but in general it is less severe with intake data because of the milder monthly cycle in food intake. An exception is that analyses of intake for particular perishable goods may still be more strongly affected. Another popular food measure is the “money value of food used out of household stores,” which is available in the Nationwide Food Consumption Surveys and the pure food stamp cash-out experiments. We did not study that measure in this paper, but the amplitude of its cycle presumably lies in between those for food expenditure and actual food intake.

Relatively recent analytic methods, which are designed to be more consistent with the well-developed economic theory of choice subject to targeted benefits, face the most severe problems if they ignore the monthly food stamp cycle (e.g., Moffitt 1989; Wilde and Ranney 1996). These studies depend centrally on the classification of participants as “unconstrained” (inframarginal) or “constrained” (extramarginal), depending on whether their monthly food spending appears greater than or equal to their food stamp benefits. If food spending and food stamp benefit variables refer to different time periods, common methods of comparing them will lead to misclassification. This, in turn, could lead to statistical bias and inconsistency, in addition to the less serious efficiency problem that Fraker discussed. Future studies that rely on the classification of food stamp participants as extramarginal or inframarginal either should use only food data and benefit data that refer to the same period or should explicitly account for time of month.

### Future Research

We recommend further research in two areas. First, it is important to assess the nutritional implications of the cycle in food intake. A central goal of the Food Stamp Program is to reduce periodic undernutrition. Also, some very recent research has suggested that indications of mild food insecurity accompanied by “disordered” or irregular eating patterns may be associated with overweight (Frongillo

et al. 1997). The association between voluntary cyclical dieting and overweight has already received much study, but further research is needed on cyclical food intake patterns among food stamp recipients.

Second, economists should develop theoretical and empirical methods that can deal with intertemporal choice over periods as short as the food stamp month. Wilde and Ranney (1997) discuss a theoretical model of choice between food and other goods over 4 weeks of the food stamp month, subject to liquidity constraints as well as the constraint that food stamps may be spent only on food. A central feature of this model is discounting over time, a workhorse of dynamic economics that may or may not be appropriate for periods as short as a month. More generally, econometricians have paid greater attention in recent years to the fact that consumption of many goods is smoother than expenditure, which complicates empirical work using typical expenditure survey data with a reference period as short as a week. Typically, the solution has been to assume that consumption is perfectly smooth, and a fixed frequency is chosen for each good's expenditure (see Meghir and Robin 1992 for an example with food goods). This solution is unattractive for research on the Food Stamp Program, where consumption is not entirely smooth and there is a deterministic pattern in the timing of expenditures.

Finally, we recommend the collection of additional data on monthly expenditure and consumption cycles. Small additions to current national surveys could open up considerable research in this area. For example, a current question on the frequency of "major" shopping trips could be followed with one on the date of the most recent such trip. Current questions on the amount of cash income received from major sources could be followed with questions on the most recent date of receipt. Since cyclical shopping by food stamp recipients may be merely the most accessible example of more common spending cycles in the larger population, these questions may shed light on consumption patterns for all respondents. These modest additions would make existing surveys more informative about the dynamics of food consumption, the Food Stamp Program, and food insecurity in the United States.



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