Chapter 4
Role of the Child and Adult Care Food Program in Children's Diets

The CACFP provides federal funds for qualifying meals served to children in nonresidential day care facilities.[28] These include some child care centers, after-school-hours child care centers, family and group child care homes, and Head Start programs.[29] Since 1999, the program also includes reimbursement for meals served to preschool children in homeless shelters. Care providers are reimbursed at various rates for up to two meals and one snack per day served to eligible children,[30] and in some cases, they receive USDA commodities. Eligibility for the child component of the CACFP is limited to children age 12 and under.[31]

The goal of the CACFP is to provide nutritious meals and snacks to children attending child care programs. To this end, USDA has established minimum requirements for meals and snacks served in participating centers and child care homes. These requirements were modeled on the school meal programs meal patterns and were designed to ensure that meals and snacks served in the CACFP provide the types and amounts of food required to help meet participants' daily energy and nutrient needs. The meal patterns specify categories of foods (meal components) to be offered at each meal and snack, as well as minimum portion sizes. Minimum portion sizes for children vary by age group.[32] Currently, CACFP meals and snacks are not required to meet specific nutrient-based standards such as those used in the NSLP and SBP.

Although the CACFP has been in existence for almost 35 years, research on the impact of the program on children's nutrition has been limited. To date there have been only a few studies documenting the relative contribution of CACFP meals and snacks to children's total diet, and none used national samples of children (Glantz, 2003). Although some research has been published on the nutrient content of meals **offered** (Briley *et al.*, 1993; Fox *et al*., 1997; Crepinsek *et al*., 2002a), the nutrient profile of meals and snacks actually consumed by participating children may differ from the meals and snacks offered by providers.[33] Thus, to gain a full understanding of the contribution

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28 The CACFP also operates in adult day care centers. This discussion is limited to the component of the program that serves children in child care centers and homes.

29 Note that Head Start is a preschool program for low-income children and does not provide child care per se. All Head Start centers are required to participate in the CACFP.

30 During the period the Early Childhood and Child Care Study was conducted, child care centers could receive reimbursement for an additional meal or snack for children in care eight or more hours per day. The regulations changed as a result of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) (P.L. 104-193). PRWORA also changed the reimbursement structure for family child care homes to more closely resemble that for centers. Higher reimbursement rates apply to meals and snacks served by low-income providers in low-income neighborhoods, or served to low-income children.

31 An exception is made for children of migrant workers and children with disabilities, who may participate through ages 15 and 18, respectively.

32 The age groups are: 1 to 2, 3 to 5, and 6 to 12 years. There is a separate meal pattern for infants.

33 For example, children may decline one or more of the foods offered; children may select portions that differ from that of the average portion; or children may waste (not consume) some of the food they take.

CACFP meals and snacks actually make to children's total energy and nutrient needs, it is necessary to examine CACFP meals and snacks **as consumed** by children. The first part of this chapter is devoted to results of just such an analysis, using data from the 1995 ECCCS. It is hoped that findings from this part of the study might assist program staff by possibly serving as the basis for developing nutrient-based standards or otherwise updating or revising menu planning guidance, nutrition education requirements for child care providers, and reimbursement policies, and to inform future CACFP research.

As discussed in Chapter 1, one measure of a successful outcome of the CACFP may be its ability to provide children of working mothers with a diet that is nutritionally comparable to that provided by mothers who are full-time homemakers. The CACFP also has the potential to dampen any negative effects of maternal employment on children's diets. The second part of this chapter is devoted to comparisons of nutrition outcomes between CACFP-participating children of working mothers and not-in-care children of nonworking mothers.

Contribution of CACFP Meals to Children's Dietary Intake

As noted above, CACFP regulations and guidance materials provide only broad standards for meals and snacks offered under the program. In the absence of specific nutrient-based standards, prior studies have used the recommendations of the American Dietetic Association (ADA) (1994 and 1999) as a benchmark for assessing the adequacy of the meals and snacks consumed by CACFP participants. The ADA recommends that children in care for eight or more hours per day receive food that provides at least one-half to two-thirds of their daily nutrition needs (based on age-appropriate RDAs). The recommendation for children in part-day programs (four to seven hours per day) is for one-third of their daily needs. In addition, the ADA recommends that meals and snacks be consistent with the *Dietary Guidelines for Americans*.

This section describes participating children's average consumption of food energy and nutrients over 24 hours, and the relative contribution of CACFP meals and snacks to total intakes. It begins with a description of the sample children and their households, overall and for the three types of CACFP care (i.e., family child care homes, Head Start centers, and child care centers). Because there are some important differences in the characteristics of participants and their families, dietary data are also presented by type of CACFP care.

The analyses suggest that, on average, total daily intakes of children participating in the CACFP meet recommendations for food energy and most dietary components. They also suggest that CACFP meals and snacks make a positive contribution to total dietary intake, but may benefit from changes to lower the fat, especially saturated fat, and sodium in foods offered and served to children. School-age children in CACFP centers tend to receive less of their daily nutrition needs from CACFP than their counterparts in homes, but this does not appear to detract from their total intakes which are adequate for most nutrients.

Characteristics of CACFP Sample Children and Their Households

The ECCCS obtained complete information on 24-hour dietary intake for 948 children, age 1 to 10 years old.[34] The data collection methods used are summarized in Chapter 1 and described in detail in the final study report (Fox *et al*., 1997). About 42 percent of the sample children received CACFP meals and snacks in Head Start centers, one-third (33 percent) in other child care centers, and nearly one-quarter (24 percent) in family child care homes.

Exhibit 4.1 presents the available demographic information on the ECCCS sample children and their households. Sampling weights were applied to reflect the national number of children in CACFP (see Appendix B for a description of the weighting methodology). The general underlying patterns, as well as differences by child care type, are important to consider in interpreting findings on the role of the CACFP in children's diets.

Almost three quarters of all children in the CACFP are preschoolers 3 to 5 years of age, with the remainder about equally split between toddlers (1 to 2 years) and school-age children (6 to 10 years). Participants are a little more likely to be white than minority (54 *versus* 46 percent), and black children are more heavily represented than other minority groups 31 *versus* 15 percent). A substantial number of children spend 8 or more hours per day in CACFP care (48 percent); another 36 percent are in care from 4 to 8 hours daily. The relatively small proportion of participants in care less than 4 hours a day are probably children who also attend school.

The average household of CACFP children consists of two adults and two children, although one third of children live in single-adult households. Most mothers with children in CACFP have some education beyond high school and are employed. As of 1995, approximately equal proportions of children were from families with incomes above and below 185 percent of poverty.

Differences between children in CACFP family child care homes and children in Head Start and child care centers are especially notable. Children in Head Start centers are all preschoolers age 3 to 5 years, and so are nearly three-quarters of children in child care centers. In contrast, fewer than half of children in child care homes are preschoolers, and over one-third are toddlers age 1 to 2. Furthermore, the great bulk (83 percent) of children in child care homes are white, and only 7 percent are black. Whites comprise only 38 and 49 percent of children in Head Start and child care centers, respectively, whereas blacks comprise 45 and 36 percent of these children.

Children in child care centers are more disadvantaged than children in family child care homes, and children in Head Start are even more so. Head Start program regulations require that no more than 10 percent of enrolled children can have family incomes above the federal poverty level. Children at or below 185 percent of poverty are eligible for reduced-price meals in Head Start and other child care centers; since PRWORA, this is also the threshold below which children's meals in homes qualify for reimbursements at the higher (Tier I) rate. Only 18 percent of children in homes fall under this cut-off, but 49 percent of children in child care centers and 88 percent of children in Head Start centers do

[34] Infants were excluded from this analysis for several reasons: (1) the number of infants in the ECCCS sample was too small to draw conclusions; (2) very little of the food consumed by infants in CACFP care is supplied by the provider (parents often supply infant formula and other baby food); and (3) infant feeding patterns are unique, i.e., they do not consume discreet meals and snacks. Eleven- to 12-year-olds were excluded because they were not adequately represented in the ECCCS sample—only two children over age 10 had complete data.

so. Similarly, the proportions living in single-adult households are 24 percent for children in homes, but 34 percent and 41 percent for children in child care and Head Start centers, respectively. The households of children in both family child care homes and child care centers, however, tend to include fewer children.

Exhibit 4.1

Characteristics of CACFP Sample Children and Their Families

	Family Child Care Homes	Head Start Centers	Child Care Centers	All CACFP
Age[a]				
1-2 years	34.9%	--	11.4%	14.1%
3-5 years	46.9	100.0%[b]	70.7	73.0
6-10 years	18.3	--	17.8	12.8
Gender[c]				
Male	42.7%	49.4%	48.9%	47.5%
Female	57.3	50.6	51.1	52.5
Race/Ethnicity				
Non-Hispanic White	82.6%	38.2%	48.8%	54.5%
Non-Hispanic Black	7.2	44.8	35.8	31.0
Hispanic	7.3	10.4	6.6	7.8
Other	2.9	6.5	8.8	6.7
Hours in CACFP care				
Less than 4	19.4%	14.5%	15.7%	16.3%
4 to 8	19.4	76.3	20.7	36.3
8 or more	61.2	9.2	7.2	47.5
Mean	*7.2*	*5.2*	*7.2*	*6.6*
Number of adults				
1	24.5%	40.7%	34.2%	33.5%
2	69.2	50.6	52.6	56.3
3 or more	6.3	8.7	13.2	10.2
Mean	*1.8*	*1.7*	*1.8*	*1.8*
Number of children				
1	35.3%	20.0%	27.9%	27.6%
2	43.5	31.0	44.2	40.4
3	15.3	25.4	15.1	18.0
4 or more	5.9	23.6	12.8	14.1
Mean	*1.9*	*2.7*	*1.8*	*2.3*

Exhibit 4.1

Characteristics of CACFP Sample Children and Their Families

	Family Child Care Homes	Head Start Centers	Child Care Centers	All CACFP
Number of household members				
2	8.0%	8.8%	8.7%	8.6%
3	35.9	22.7	27.0	28.0
4	36.8	26.3	35.5	33.3
5	12.5	21.1	19.3	18.1
6 or more	6.9	21.1	9.5	12.1
Mean	*3.8*	*4.4*	*4.0*	*4.1*
Household income as percent of poverty				
At or below 185%	18.1%	87.7%	48.6%	51.8%
Over 185%	81.9	12.3	51.4	48.2
Mother's education				
Less than high school/GED	3.2%	20.9%	8.6%	10.8%
High school/GED	31.2	44.7	24.2	31.8
More than high school/GED	65.5	34.4	67.1	57.4
Mother's employment status				
Homemarker	5.4%	44.6%	10.8%	18.8
In school	8.4	8.0	9.8	8.9
Working	86.2	47.5	79.4	72.2
Sample size	231	402	315	948

a Infants and 11- to 12-year-olds (*n*=2) are excluded.

b Head Start specifically targets preschoolers. Two Head Start children in the 6- to 10-year age group were dropped from the sample as anomalous.

c Children for whom gender was missing (*n*=3) are excluded.

Data were missing on race/ethnicity, household size and income, and mother's employment status for 2 percent of children in child care centers, 4 percent in family child care homes, and up to 7 percent in Head Start centers.

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

Finally, the mothers of children in family child care homes and child care centers are considerably more highly educated than mothers of children in Head Start centers (66 to 67 percent *versus* 34 percent with more than a high school degree or GED). These mothers are also overwhelmingly likely to be working (86 percent and 79 percent, respectively). Fewer than half (47 percent) of mothers of Head Start children are working; as noted previously, these are not child care programs, but rather enrichment programs.

Note that although most of the children in CACFP homes in 1995 were in families with household income above 185 percent of poverty, since tiering, the share of low-income children has increased.[35] Likewise, although mothers of children in child care centers and family care child homes were substantially more likely to be employed in 1995 than mothers with children in Head Start, this may also have changed with PRWORA.

Children's 24-Hour Dietary Intake and the Role of CACFP Meals and Snacks

Children's intakes of total food energy and 12 nutrients and other dietary components were calculated for the full 24-hour period and, separately, for the contribution from CACFP meals and snacks. The unit of analysis was the "child-day," representing children's dietary intake over the course of a typical day in CACFP child care. Dietary intake findings, tabulated overall and by type of CACFP care and age group,[36] are discussed below. The standard errors for all mean nutrient values are tabulated in Appendix E. Note that results for the 6-to-10-year age group are based on fewer than 100 child days.

The response rate to the dietary recall interview in the ECCCS was low, 41 percent. The nonresponse analysis in Appendix D did not find evidence of substantial bias when 24-hour recall respondents' energy intake during CACFP care was compared with that of other observed children. There is still the possibility that nonrespondents' out-of-CACFP-care dietary intake was systematically different from that of respondents, which would bias our results. USDA's Food and Nutrition Service therefore recommends that these analyses should not be considered as representative of CACFP participants or of the impact of the program.

Food Energy and Key Nutrients

Exhibit 4.2 shows results of the analysis of children's intake of food energy, protein, and key vitamins and minerals. The nutrients selected for analysis are those for which standards have been established for the school meal programs (NSLP and SBP). Intakes of food energy and key nutrients are expressed as a percent of the RDA.[37] The most recently published RDAs at the time of analysis were used (NRC, 1989a; IOM, 1997, 2000, and 2001).[38] Calcium intake is shown relative to both the 1989 RDA and the Adequate Intake (AI) level released as part of the 1997 Dietary Reference Intakes (DRIs), because a new calcium RDA could not be established.

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35 The Family Child Care Homes Legislative Changes Study found about twice as many children with household income at or below 185 percent of poverty in CACFP homes in 1999 than in 1995 (39 *vs.* 21%; Crepinsek *et al.*, 2002b).

36 Sample sizes precluded further stratification, for example, by hours in CACFP care or common meal and snack combinations. For the most part, age is a reasonable proxy for full-day (toddlers and preschool children) and part-day care (school-age children).

37 The RDAs for children age 6 to 10 were calculated as weighted averages of the corresponding 1989 RDAs for children age 4 to 6 and children age 7 to 10. Because life stage (age/gender) groups for the newer RDAs (i.e., those developed to replace the 1989 RDAs; IOM/FNB, 1997, 2000, and 2001) differ from the age groups used in the 1989 RDAs, the RDAs used for children age 3 to 5 are the weighted average of new RDAs for children age 1 to 3 and 4 to 8. The new RDAs for children age 6 to 10 are the weighted averages for children age 4 to 8 and the separate RDAs for males and females age 9 to 13.

38 In addition to new reference values for food energy (EERs), DRIs were recently released for the macronutrients protein, carbohydrate, fat, and fiber (IOM/FNB, 2002). As noted in Chapter 2, EERs for children vary by age, gender, and physical activity level. Because data on physical activity were not collected in the ECCCS, it is not possible to predict what the effect of applying EERs to the analysis would be. For protein, new RDAs are somewhat lower for children age 1 to 5 (13 to 19 grams per day), and somewhat higher for the 6 to 10 age group (19 to 34 grams), relative to 1989 RDA values for children age 1 to 10 (16 to 28 grams). Applying the new protein RDAs would not meaningfully alter the results presented here.

Exhibit 4.2

Average Food Energy and Key Nutrients Consumed in CACFP Care and Over 24 Hours, by Age of Child[a]

	Family Child Care Homes		Head Start Centers		Child Care Centers		All CACFP	
	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP
Food energy (1989 REA)								
1-2 years	108%	47%	--	--	102%	43%	106%	45%
3-5 years	97	45	100%	36%	104	40	101	39
6-10 years	102	25	--	--	87	14	93	18
Protein (1989 RDA)								
1-2 years	337%	148%	--	--	324%	134%	333%	143%
3-5 years	294	140	318%	117%	319	120	314	122
6-10 years	300	66	--	--	233	38	257	48
Vitamin A (1989 RDA)								
1-2 years	206%	101%	--	--	183%	85%	199%	95%
3-5 years	193	98	234%	109%	207	85	215	96
6-10 years	219	42	--	--	149	30	174	34
Vitamin C (2000 RDA)								
1-2 years	636%	201%	--	--	638%	272%	637%	224%
3-5 years	443	195	572%	181%	549	203	540	193
6-10 years	422	91	--	--	386	106	399	100
Calcium (1997 AI)								
1-2 years	200%	99%	--	--	158%	79%	186%	92%
3-5 years	156	86	138%	66%	147	71	145	72
6-10 years	148	38	--	--	108	26	122	30

Exhibit 4.2

Average Food Energy and Key Nutrients Consumed in CACFP Care and Over 24 Hours, by Age of Child[a]

	Family Child Care Homes		Head Start Centers		Child Care Centers		All CACFP	
	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP
Calcium (1989 RDA)								
1-2 years	125%	62%	--	--	99%	49%	116%	58%
3-5 years	128	72	128%	61%	124	60	126	63
6-10 years	158	41	--	--	118	27	133	32
Iron (2001 RDA)								
1-2 years	156%	61%	--	--	134%	58%	149%	60%
3-5 years	138	55	140%	45%	135	47	138	47
6-10 years	175	35	--	--	126	14	144	22
Zinc (2001 RDA)								
1-2 years	241%	97%	--	--	221%	92%	234%	95%
3-5 years	196	87	218%	74%	212	82	212	79
6-10 years	229	40	--	--	188	24	203	30
Number of child days								
1-2 years	128	128	--	--	73	73	201	201
3-5 years	161	161	574	574	352	352	1,087	1,087
6-10 years	59	59	--	--	41	41	100	100

a All means are expressed as a percent of age-weighted RDAs. Calcium intake is also presented as a percent of the DRI-based AI value.

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

Estimated total food energy intake among CACFP participants falls within 8 percent of the 1989 REA for all age groups, in almost all types of CACFP care. The one exception is 6- to 10-year old children in child care centers, whose average daily food energy intake falls below the REA. This value is lower than the mean percent of REA for 6- to 10-year olds in family child care homes (87 *versus* 102 percent; $p < 0.10$). Mean energy intakes below the REA are not particularly concerning, given the high prevalence of overweight among all U.S. children.[39]

CACFP meals and snacks overall contribute an average of 45 and 39 percent of the REA for toddlers and preschool children (1-2 and 3-5 age groups). For 1- to 5-year olds in care at least 8 hours per day (in homes and centers), the CACFP contribution to energy intake falls just below the ADA recommendation that children receive food that provides at least one-half of their daily nutrition needs. The share of total food energy from CACFP for children in part-day care, including Head Start, is in line with the one-third-daily-needs recommendation.

For children age 6 to 10, the CACFP contribution to total food energy intake is about half as much as for younger children (18 percent), falling below the ADA recommendation for part-day care. This reflects the relatively few hours per day school-age children spend in child care (median of 3 hours per day) and differences in patterns of consumption of CACFP meals and snacks (Glantz *et al*., 1997; Fox *et al*., 1997).

With regard to 24-hour intake of protein, vitamins A and C, calcium, iron, and zinc, children in CACFP care are consuming, on average, considerably more than the RDA. These results do not seem to vary with child age or the type of CACFP child care (Exhibit 4.2). Although mean 24-hour intakes are higher than recommended levels, there is still some proportion of children whose usual intake is below the RDA for one or more of these nutrients. This cannot be determined from group means, which are based on only one day's food intake. Nevertheless, given the magnitude of most point estimates, the share of children with inadequate intakes is likely to be small.[40]

CACFP meals and snacks alone provide more than 100 percent of the RDA for protein and vitamin C, and close to 100 percent of the vitamin A RDA, for both toddlers and preschool children ages 1 to 5. The CACFP contribution to calcium, iron, and zinc requirements is also substantial for these groups, ranging from means of 47 percent of the iron RDA for 3- to 5-year olds to 95 percent of the zinc RDA for 1- to 2-year olds. CACFP meals and snacks consumed by children age 1 to 5 meet the full-day-care ADA recommendations for all of these key nutrients, regardless of type of CACFP care.[41]

As with energy intake, CACFP contributes a smaller share of school-age children's nutrient requirements compared with younger children age 1 to 5. Overall, children age 6 to 10 consume 100 percent of the RDA for vitamin C in CACFP care, and from approximately one quarter to one half the RDA

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[39] The possibility of underreporting of food energy intake cannot be ruled out. As described in Chapter 1, dietary data on meals and snacks consumed in CACFP were collected by trained observers, but for the remaining part of the day, dietary recalls were conducted with parents by telephone. The problem is more likely to be concentrated among the 6- to 10-year old children for whom fewer meals and snacks were directly observed, and because parents may not be aware of all foods and beverages consumed while at school.

[40] As noted in Chapter 2, the type of analysis required to determine the share of children with inadequate nutrient intakes was beyond the scope of this project.

[41] The 95 percent confidence interval for the percent of RDA for iron among 3- to 5-year old children in centers is 37 to 57 percent.

for the other nutrients examined. With the exception of iron, school-age children's intake in CACFP care meets or approximates the ADA part-day recommendation of one-third daily requirements for all of the nutrients examined. The lower contribution to iron intake is due to 6-to 10-year old children in centers. These children consume significantly less of their RDA for iron in CACFP than their counterparts in family child care homes (14 *versus* 35 percent of RDA). One explanation for the disparity may relate to the ECCCS finding that few older children were receiving breakfast in center care—ready-to-eat (presumably iron-fortified) cereals were a major source of iron in CACFP breakfasts overall (Fox *et al*., 1997).

Fat, Saturated Fat, and Carbohydrate

Children's intakes of total fat, saturated fat, and carbohydrate, expressed as a percent of total food energy, were compared to *Dietary Guidelines* and the National Research Council's (NRC) recommendations for these macronutrients. Results are shown in Exhibit 4.3 for children 3 to 5 and 6 to 10 years of age.[42] Current *Dietary Guidelines* recommend that children over 2 years of age consume no more than 30 percent of food energy from total fat and less than 10 percent from saturated fat (USDHHS and USDA, 2000). The NRC's *Diet and Health* report calls for consumption of more than 55 percent of total food energy from total carbohydrate (NRC, 1989b). Although these recommendations are intended to apply to total daily intake, it is useful to consider the extent to which CACFP meals and snacks may enhance or detract from meeting these benchmarks over the full 24-hour period.

The analysis suggests that CACFP children consume diets that approach, but do not quite meet daily dietary recommendations for the three macronutrients examined.[43] That is, mean total fat and saturated fat intakes exceed *Dietary Guidelines* recommendations, and total carbohydrate intake falls slightly below the NRC-recommended level. There is virtually no variation between the preschool and school-age groups, or across the three types of CACFP care. Point estimates for 3- to 5-year old children in CACFP are approximately 32 percent of total food energy from fat, 13 percent of energy from saturated fat, and 54 percent of energy from carbohydrate. These findings are comparable to estimates of fat, saturated fat, and carbohydrate intake among U.S. children of similar ages, as measured in the 1994 to 1996 and 1998 CSFII (USDA/ARS, 1999).

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[42] *Dietary Guidelines* and NRC recommendations for daily intake apply only to children age 2 and above. For the relevant nutrients/dietary components, results are presented only for the CACFP age groups for which recommendations fully apply.

[43] Acceptable Macronutrient Distribution Ranges (AMDRs) have been set for total fat and carbohydrate (IOM/FNB, 2002). The AMDR for fat is 30 to 40 percent of total food energy for children age 1 to 3 and 25 to 35 percent for children age 4 to 18; the AMDR for carbohydrate is 45 to 65 percent of energy. If these ranges were used in this analysis, conclusions about participants' diets and the CACFP contribution would differ. That is, the mean percent of food energy from total fat and from carbohydrate fall within the acceptable ranges, for participants of all ages, in all types of CACFP care, both over 24 hours and from CACFP meals and snacks alone.

Exhibit 4.3

Average Intake of Selected Macronutrients in CACFP Care and Over 24 Hours, by Age of Child

	Daily Recommendation (% food energy)	Family Child Care Home		Head Start Centers		Child Care Centers		All CACFP	
		% Total Food Energy in 24 Hours	% Total Food Energy from CACFP	% Total Food Energy in 24 Hours	% Total Food Energy from CACFP	% Total Food Energy in 24 Hours	% Total Food Energy from CACFP	% Total Food Energy in 24 Hours	% Total Food Energy from CACFP
Total fat									
3-5 years	≤ 30%[a]	31.7%	30.4%	31.8%	30.2%	31.7%	29.8%	31.7%	30.1%
6-10 years	≤ 30	30.7	30.2	--	--	32.7	23.5	32.0	26.0
Saturated fat									
3-5 years	< 10%[a]	13.2%	13.2%	12.9%	13.5%	12.6%	12.7%	12.8%	13.1%
6-10 years	< 10	12.4	12.2	--	--	13.7	10.3	13.2	11.0
Carbohydrate									
3-5 years	> 55%[b]	54.2%	55.6%	53.0%	54.0%	53.9%	56.6%	53.6%	55.4%
6-10 years	> 55	54.6	57.8	--	--	54.5	70.8	54.5	65.9
Number of child days									
3-5 years		161	161	574	574	352	352	1,087	1,086
6-10 years		59	59	--	--	41	39	100	98

a *Dietary Guidelines* recommendations (USDHHS/USDA, 2000).

b NRC recommendation (NRC, 1989b).

Dietary Guidelines and NRC recommendations are only applicable to children age 2 and older. This analysis was limited to children age 3 to 5 and 6 to 10, the only CACFP age groups for which the recommendations fully apply.

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

Meals and snacks consumed by children in CACFP care provide levels of total fat and carbohydrate that are consistent with *Dietary Guidelines* and NRC recommendations, respectively. For children in the 3- to 5-year age group, CACFP contributes, on average, approximately 30 percent of food energy as fat and 55 percent as carbohydrate. The CACFP contribution to daily intake of saturated fat (13 percent of food energy) exceeds recommendations for this age group, but not disproportionately so relative to other food sources. It appears that preschool children are consuming about the same share of energy from saturated fat in CACFP care and out of care. Again, there are virtually no differences by type of care.

Findings for the contribution of CACFP to the macronutrient intakes of 6- to 10-year-old children are similar to that for younger children, when compared to dietary recommendations. For this group, some differences are seen, however, by type of care. Compared with school-age children in homes, children in centers consume somewhat less energy from total fat (24 *versus* 30 percent; $p < 0.10$), and considerably more energy from carbohydrate (71 *versus* 58 percent; $p < 0.05$). Differences in the types of meals consumed by children age 6 to 10 in care (more breakfasts/lunches in homes and more high-carbohydrate snacks in centers) may explain the differences in macronutrient intake from CACFP between centers and homes.[44]

Cholesterol, Sodium, and Dietary Fiber

Children's dietary intake was also examined relative to the NRC's dietary recommendations for cholesterol and sodium (1989b) and the American Health Foundation's recommendation for dietary fiber intake in children over age 2 (Williams, 1995). These recommendations call for daily intakes of no more than 300 mg dietary cholesterol, no more than 2,400 mg sodium, and between 8 and 15 grams of dietary fiber per day (based on "age-plus-five grams per day" for children age 3 to 10). Exhibit 4.4 presents the proportion of daily recommended levels consumed over 24 hours and in CACFP for each of these dietary components. The contribution from CACFP meals and snacks is also expressed as a ratio relative to the CACFP contribution for total food energy.

The diets of both preschool and school-age CACFP participants meet recommendations, on average, for daily levels of cholesterol and dietary fiber. Cholesterol intakes are 66 and 60 percent of the 300 mg maximum, and dietary fiber intakes, 130 and 107 percent of the recommended minimums. Findings are qualitatively similar for children in all three types of CACFP care. In contrast, CACFP children's mean sodium intake exceeds the 2,400 mg daily maximum, by approximately 9 percent (216 mg) for 3- to 5-year-olds and 20 percent (480 mg) for children age 6 to 10. Preschool children in Head Start are more likely to consume excess sodium than their counterparts in CACFP homes and centers ($p < 0.001$ and $p < 0.10$, respectively).

[44] Data from the ECCCS suggest that children age 6 to 10 in family child care homes are substantially more likely to receive breakfast and lunch than 6- to-10-year-olds in child care centers (Glantz *et al*., 1997). In addition, although children in centers are somewhat more likely to receive snacks than children in homes (99 *versus* 70 percent), snacks tend to be lower in energy content than either breakfasts or lunches (Fox *et al*., 1997).

Exhibit 4.4a

Average Cholesterol, Sodium, and Dietary Fiber Consumed in CACFP Care and Over 24 Hours, by Age of Child

		Family Child Care Homes			Head Start Centers			Child Care Centers		
	Daily Recommendation	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Total from Meals in Care Relative to % Total Energy from Meals in Care	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Total from Meals in Care Relative to % Total Energy from Meals in Care	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Total from Meals in Care Relative to % Total Energy from Meals in Care
Cholesterol										
3-5 years	≤ 300 mg[a]	59%	27%	0.97	76%	28%	1.05	66%	24%	0.97
6-10 years	≤ 300 mg	81	25	1.09	--	--	--	60	8	0.52
Sodium										
3-5 years	≤ 2,400 mg[a]	99%	46%	0.98	116%	40%	0.98	108%	41%	0.96
6-10 years	≤ 2,400 mg	123	26	0.78	--	--	--	119	14	0.47
Dietary fiber										
3-5 years	> 8-10 g[b]	122%	56%	0.99	133%	50%	1.11	131%	55%	1.12
6-10 years	> 11-15 g[b]	104	25	0.91	--	--	--	108	19	1.47
Number of child days										
3-5 years		161	161	161	574	574	574	352	352	352
6-10 years		59	59	59	--	--	--	41	41	41

a NRC recommendation (NRC, 1989b).

b Based on American Health Foundation recommendation (Williams, 1995).

NRC and American Health Foundation recommendations are only applicable to children age 2 and older. This analysis was limited to children age 3 to 5 and 6 to 10, the only CACFP age groups for which the recommendations fully apply.

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

Exhibit 4.4b

Average Cholesterol, Sodium, and Dietary Fiber Consumed in CACFP Care and Over 24 Hours, by Age of Child, All CACFP

		All CACFP		
	Daily Recommendation	% Daily Recommendation in 24 Hours	% Daily Recommendation from CACFP	% Total from Meals in Care Relative to % Total Energy from Meals in Care
Cholesterol				
3-5 years	≤ 300 mg[a]	68%	26%	1.00
6-10 years	≤ 300 mg	68	14	0.74
Sodium				
3-5 years	≤ 2,400 mg[a]	109%	41%	0.97
6-10 years	≤ 2,400 mg	120	18	0.59
Dietary fiber				
3-5 years	> 8-10 g[b]	130%	53%	1.10
6-10 years	> 11-15 g[b]	107	21	1.25
Number of child days				
3-5 years		1,087	1,087	1,087
6-10 years		100	100	100

a NRC recommendation (NRC, 1989b).

b Based on American Health Foundation recommendations (Williams, 1995).

NRC and American Health Foundation recommendations are only applicable to children age 2 and older. This analysis was limited to children age 3 to 5 and 6 to 10, the only CACFP age groups for which the recommendations fully apply.

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

The contribution from CACFP to 3- to 5-year-old participants' dietary fiber intake is sizeable (53 percent of the recommended level). It meets the ADA recommendation for full-day care,[45] and surpasses the CACFP contribution to total food energy intake (ratio of 1.10). CACFP provides preschool children with about one quarter the daily maximum for dietary cholesterol, and 41 percent of the recommended limit for sodium. Although total sodium intake is somewhat high for this group of children, the amount from CACFP meals and snacks is not disproportionately high relative to its contribution to total food energy (ratio of 0.97). No differences by type of child care were found.

[45] As noted in Chapter 2, new DRI values (AIs) for total fiber are substantially higher than previous fiber recommendations for children. Reference values for children 1 to 10 years of age range from 19 to 31 grams per day (IOM/FNB, 2002). The effect of applying the new reference values to this analysis would be to reduce the mean percent of reference levels of dietary fiber overall and from CACFP meals and snacks; the contribution from CACFP would likely fall below the ADA recommendation for full-day care.

CACFP meals and snacks supply significantly less cholesterol, sodium, and dietary fiber for children 6 to 10 years of age compared with preschoolers (8 to 19 percent of recommended levels; $p < 0.001$ to $p < 0.05$). This is consistent with findings for total food energy, and the fewer meals and snacks they receive in care. As for the younger children, participants age 6 to 10 consume a high ratio of their dietary fiber to food energy requirements in CACFP care (ratio of 1.47). Finally, there is some evidence that school-age children in CACFP homes receive more cholesterol and sodium in care than those in centers; differences in point estimates for dietary fiber are not statistically significant.

Comparison of Diet Quality Between CACFP Children of Working Mothers and Not-in-Care Children of Nonworking Mothers

As shown in Chapter 2, children of working mothers tend to have worse dietary outcomes than children of nonworking mothers. CACFP participation might, however, ameliorate these differences. The purpose of the analysis discussed here was to determine whether children in CACFP care whose mothers work or are in school do as well as other children in terms of the nutritional quality of their diets. Outcome measures selected for this comparison include the Healthy Eating Index (HEI) scores, total food energy intake, and intake of other foods and nutrients important to the quality of children's diets. The analysis was limited to children 1 to 5 years of age, the group for whom CACFP and maternal employment were expected to have the most impact.

The samples of children were drawn from the 1995 ECCCS and the 1994-1996 CSFII[46] data sets. The ECCCS sample excluded children in CACFP whose mothers were neither working nor in school.[47] For the CSFII sample, children who consumed any meals or snacks from a child care center, family child care home, or in school **on the days covered by the dietary recalls** were excluded. Thus, the comparison was between children for whom the CACFP was likely substituting for mothers' care, and children not in child care for whom mothers' care was available.[48] Because ECCCS data were collected only on weekdays, dietary recalls for weekend days in the CSFII were discarded. The resulting samples from the ECCCS and the CSFII were 633 and 954 children, respectively.

It is important to recognize that the methods used to collect dietary data in the ECCCS and the CSFII were not identical. As described in Chapter 1, direct observation in conjunction with a menu survey of providers was used to obtain information on children's consumption of meals while in CACFP care; in addition, a telephone interview with the child's parent was conducted within 48 hours of the observation day to obtain information on the rest of the day's intake. In the CSFII, 24-hour recall data for children age 1 to 5 were collected in-person from the parent or other caregiver.

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46 To determine whether data from the 1998 CSFII could be used, selected measures of diet quality were compared between children from the 1994-1996 and 1998 samples. This analysis suggested there had been some shifts in the composition of children's diets that could potentially bias the comparison with data from the 1995 ECCCS. Therefore, observations from the 1998 CSFII were excluded.

47 This was the main excluded group, about three quarters of whom were 3- to 5-year-old children attending a Head Start program. Also excluded from the ECCCS sample were children in households with no female adults (n=17) and those in households where there were multiple related adult females with mixed employment statuses (n=3).

48 This group may have included some children who attended child care on days other than those for which dietary intake data were collected. For the purposes of this analysis, it was assumed that children's food consumption would only be influenced by meals received in child care on the days they actually consumed those meals and would not be affected by long-term patterns of child care participation.

The sections that follow present descriptive information on the sample children and their households, and the comparisons of children's diets. For about half the children in the ECCCS sample, intake data were available for two days, whereas for the other half data were available for only a single day. Many of the outcomes of interest are non-linear functions of intake, such as HEI component ratings based on numbers of servings in various food groups. Averaging such outcomes for a child over two days gives a different result than calculating the outcomes based on a two-day average of the child's intake.[49] To ensure that the constructed outcomes were comparable for children with one and two days of data, the approach was to calculate all outcomes on a **child-day** basis, and then to split to the child's sample weight between the two observations when both were available.

Two days of data were available for all children in the CSFII sample. The outcomes from these intake data were also calculated from the individual child-day records rather than from two-day averages of intake amounts. Sampling weights were then applied to reflect the national number of children in CACFP and the U.S. population (see Appendix B). Children under 2 years of age are not included in tabulations or the discussion of results for dietary measures where reference values do not apply. This was the case for all nutrition outcomes other than food energy, iron, and zinc.

The analysis finds that CACFP participants with working mothers are consuming diets of higher quality overall than children of homemakers not in child care. Based on the HEI, more children in CACFP received a "good" diet rating, and fewer had "poor" diets relative to those not in care. In addition, CACFP participants consume less soft drinks and added sugar. As for all children age 1 to 5 whose mothers work, CACFP participants in care over four hours per day are more likely to exceed recommendations for total food energy than their not-in-care counterparts with homemaker mothers. Other the other hand, they are also less likely to have average energy intakes below the desired levels. Both groups of children consume diets high in iron, zinc, and dietary fiber. They also do not differ in their intake of fried potatoes, but consume substantially less than the recommended three servings of vegetables per day.

Characteristics of Sample Children and Their Families

Exhibit 4.5 presents descriptive information on the ECCCS and CSFII sample children and their households. Several differences between the two groups emerged. In particular, compared with not-in-care children of homemaker mothers, CACFP children with working mothers are:

- Older (more preschoolers and fewer toddlers)
- More likely to be black and less likely to be Hispanic
- Less likely to be low-income or receiving public assistance
- Living in smaller households
- More likely to be located in the midwest or south and less likely to be located in the west
- More likely to have mothers with education beyond a high school degree or the equivalent.

49 For example, a child who ate no fruit on Day 1 and ample fruit on Day 2 would have HEI fruit component scores of 0 and 10 for the two days, averaging to a 5; but a score that was based on the two-day average of fruit intake might be 10.

Exhibit 4.5

Characteristics of Sample Children Age 1 to 5 and Their Households

	CACFP Participants with Working Mothers	Not-in-Care Children with Nonworking Mothers
Age		
1 year	6.6%	30.4%
2 years	12.0	28.3
3 years	25.9	12.3
4 years	29.6	11.7
5 years	25.8	17.5
Gender		
Male	47.8%	52.1%
Female	52.2	47.9
Race/Ethnicity		
Non-Hispanic White	55.0%	60.1%
Non-Hispanic Black	30.0	11.2
Hispanic	7.6	21.5
Other	7.4	7.3
Hours in CACFP care		
Less than 4	5.9%	--
4 to 8	30.5	--
8 or more	63.6	--
Mean	*7.6*	--
Household income as percent of poverty		
At or below 185%	47.1%	56.7%
Over 185%	52.9	43.3
Median	*202.9*	*160*
Public assistance		
Receiving assistance	9.7%	20.1%
Not receiving assistance	90.3	79.9
Household size/composition		
Mean number of household members	3.9%	4.7%
Mean number of adults	1.8	2.1
Mean number of employed adults	1.6	0.9
Mean number of children	2.1	2.6
Region		
Northeast	18.8%	19.9%
Midwest	28.7	19.4
South	36.9	31.1
West	15.6	29.6

Exhibit 4.5

Characteristics of Sample Children Age 1 to 5 and Their Households

	CACFP Participants with Working Mothers	Not-in-Care Children with Nonworking Mothers
Mother's education[a]		
Less than high school/GED	8.1%	25.6%
High school/GED	28.5	25.2
More than high school/GED	63.4	39.2
Sample size	633	954

a Data on mothers' education were available for 85 percent of CACFP sample.

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

These differences are similar to those seen between children of working and nonworking mothers in general, as documented in Chapter 2 (and Appendix C).

To control partially for the disparities in family income and household composition, the diet quality measures examined here are tabulated separately for subgroups defined by income relative to 185 percent of the federal poverty level and the number of adults in the household. Note that some subgroups contain less than 100 observations. Sample sizes were too small to stratify by other characteristics, such as child age, race/ethnicity, region, or mother's education.

Comparisons of Diet Quality: Healthy Eating Index

The HEI, as described in Chapter 2 of this report, provides an assessment of the degree to which an individual's diet meets the recommendations of the USDA Food Guide Pyramid and the *Dietary Guidelines*. Both overall HEI scores and all ten component scores were compared between the CACFP and CSFII groups,[50] and the results are shown in Exhibit 4.6. Note that here, and throughout the remainder of this chapter, results for the CACFP children are presented separately for those in child care more than four hours per day and four or fewer hours per day. Although the majority of CACFP participants age 1 to 5 years are in care for a significant portion of the day, it was expected that any nutritional effects of the programs would be less pronounced for those in part-day child care.

[50] HEI scores for the CSFII sample were available on-line from USDA (www.cnpp.usda.gov/hei9496data.htm, accessed April 2002). Scores for the ECCCS sample were computed based on USDA food codes and nutrients, and documentation provided in Bowman *et al*., 1998.

Exhibit 4.6

Mean Healthy Eating Index Scores[a]

	CACFP Participants with Working Mothers		Not-in-care Children with Nonworking Mothers
	≤ 4 hr in CACFP Care	> 4 hr in CACFP Care	
All children age 2 to 5			
HEI – total score	73.7***	73.8***	69.7
Grain score	7.4	7.2**	7.6
Vegetable score	4.9	5.3	5.0
Fruit score	7.9***	8.1***	6.2
Milk score	8.0**	8.8***	7.0
Meat score	5.4	5.3	5.8
Total fat score	8.0**	7.8**	7.2
Saturated fat score	5.6	4.6***	5.4
Cholesterol score	9.2	9.3*	9.0
Sodium score	8.4	8.3***	8.8
Variety score	8.8***	9.3***	7.7
Maximum sample size	107	479	696
By income category			
Up to 185% of poverty			
HEI – total score	73.4***	74.5***	68.2
Grain score	7.3	7.1	7.5
Vegetable score	4.9	5.8**	5.0
Fruit score	7.7***	8.1***	5.8
Milk score	8.4***	8.6***	6.9
Meat score	6.1	6.1	6.2
Total fat score	7.5	7.6**	6.9
Saturated fat score	4.8	4.6	5.1
Cholesterol score	9.3**	9.1*	8.7
Sodium score	8.4	8.0**	8.6
Variety score	9.1***	9.3***	7.6
Maximum sample size	75	259	400
Over 185% of poverty			
HEI – total score	74.1	73.3*	71.5
Grain score	7.5	7.2**	7.8
Vegetable score	4.9	4.8	5.1
Fruit score	8.4***	8.1***	6.8
Milk score	7.3	8.9***	7.2
Meat score	4.3	4.6*	5.3
Total fat score	8.9***	7.9	7.7
Saturated fat score	7.0*	4.6***	5.9
Cholesterol score	9.1	9.4	9.3
Sodium score	8.3	8.5*	8.9
Variety score	8.4	9.2***	7.7
Maximum sample size	32	220	296

Exhibit 4.6

Mean Healthy Eating Index Scores[a]

	CACFP Participants with Working Mothers		Not-in-care Children with Nonworking Mothers
	≤ 4 hr in CACFP Care	> 4 hr in CACFP Care	
By number of adults			
One			
HEI – total score	73.6***	74.3***	65.1
Grain score	7.1	7.2	7.3
Vegetable score	4.3	5.4	4.8
Fruit score	8.1***	8.1***	5.2
Milk score	7.6	8.8***	7.5
Meat score	5.1	6.3	6.4
Total fat score	8.4***	7.4***	6.0
Saturated fat score	6.1***	4.7*	3.7
Cholesterol score	9.6***	8.9	8.4
Sodium score	8.7	8.1	8.2
Variety score	8.6	9.5***	7.6
Maximum sample size	45	157	74
Multiple			
HEI – total score	73.8**	73.6***	70.3
Grain score	7.6	7.2**	7.7
Vegetable score	5.4	5.2	5.1
Fruit score	7.8***	8.1***	6.4
Milk score	8.4***	8.8***	7.0
Meat score	5.7	4.9**	5.7
Total fat score	7.6	7.9**	7.4
Saturated fat score	5.2	4.6***	5.7
Cholesterol score	8.9	9.5**	9.0
Sodium score	8.1*	8.4***	8.8
Variety score	9.0***	9.1***	7.7
Maximum sample size	62	322	622

a Range of scores for the HEI is 0 to 100; ranges for each component of the HEI are 0 to 10. The overall HEI score is the simple sum of the scores for each of the 10 components.

*** Statistically significant difference from children of nonworking mothers at the 1 percent level
** Statistically significant difference from children of nonworking mothers at the 5 percent level
* Statistically significant difference from children of nonworking mothers at the 10 percent level

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

Both part- and full-day CACFP participants with working mothers have significantly higher mean overall HEI scores than not-in-care children of nonworking mothers (74.3 and 73.9 *versus* 69.7).[51] Findings were similar for most subgroups, although differences are greatest for children in low-income and single-adult households. Mean HEI scores for CACFP participants are 6 to 9 points higher relative to not-in-care children of homemakers and suggest a positive influence of the program for these more disadvantaged groups of children.

The analysis of HEI components finds that overall scores represent the net effect of some variability in the direction of differences between children's individual component scores. Overall, the CACFP children with working mothers score significantly higher for fruit, milk, total fat, and dietary variety than the not-in-care group with nonworking mothers. This finding is independent of the hours spent in CACFP care. At the same time, CACFP children have significantly lower scores for grain, meat, saturated fat, and sodium when in care more than four hours per day. The higher HEI component scores among CACFP children seem to persist despite differences in family income and the number of adults in the household. The lower component scores, however, are almost exclusively concentrated among children with incomes over 185 percent of poverty and in multiple-adult households.

The differences in overall HEI scores between CACFP participants with working mothers and not-in-care children of homemakers are reflected in some, but not all, of the HEI diet ratings. As shown in Exhibit 4.7, three-quarters of children in both groups consume diets that "need improvement." With respect to a "good diet" rating, the proportion is significantly larger when CACFP participants in care more than four hours per day are compared with children not in care (25 *versus* 20 percent; $p<0.10$). The magnitude of this difference is similar for children who spend less time in care and across all subgroups, but generally not statistically significant. In contrast, the finding that fewer CACFP children had "poor diets" compared with children not in care was highly significant (0 to 0.2 *versus* 7 percent) and consistent across all income and household composition subgroups.

Comparisons of Diet Quality: Food Energy and Selected Nutrients

Children's intakes of total food energy, iron, zinc, and dietary fiber were assessed because of their links to physical and cognitive development and overall health. HEI scores alone may not reveal problematic levels of these dietary components. As for the prior analyses, children's food energy and nutrient intakes are expressed as percentages of available recommended daily values (Exhibit 4.8).[52] For food energy, approximations of the proportion of children with intakes exceeding 10 percent above and 10 percent below the 1989 REA are also provided.[53]

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[51] To find out if these positive findings were simply a reflection of differences in characteristics of the samples, total HEI score was also estimated in a multivariate model that included measures of hours in CACFP care, child age, gender, race/ethnicity, household income, receipt of public assistance, number of adults and number of children in the household, mother's education, and region. The estimated regression-adjusted differences in HEI score were quite comparable (4.3 for children in care 4 or fewer hours per day, and 4.0 for children in care more than 4 hours per day; $p < 0.0001$ for both).

[52] As discussed earlier in this chapter, new reference values for food energy and total fiber have been released, but were not available at the time these analyses were completed.

[53] These are arbitrary cutoff values, and are not intended as a measure of adequacy of energy intake.

Exhibit 4.7

HEI Diet Rating[a]

	CACFP Participants with Working Mothers		Not-in-care Children of Nonworking Mothers
	≤ 4 hr in CACFP Care	> 4 hr in CACFP Care	
All children age 2 to 5			
Poor diet	0.0%***	0.2%***	6.7%
Diet needs improvement	75.4	74.6	73.7
Good diet	24.6	25.1*	19.6
Maximum sample size	107	479	696
By income category			
Up to 185% of poverty			
Poor diet	0.0%***	0.4%***	8.7%
Diet needs improvement	81.9	76.6	72.2
Good diet	18.1	23.0	19.1
Maximum sample size	75	259	400
Over 185% of poverty			
Poor diet	0.0%***	0.2%***	4.3%
Diet needs improvement	64.4	73.0	75.5
Good diet	35.6	26.8	20.2
Maximum sample size	32	220	296
By number of adults			
One			
Poor diet	0.0%***	0.0%***	15.0%
Diet needs improvement	77.6	74.8	67.5
Good diet	22.4	25.2	17.5
Maximum sample size	45	157	74
Multiple			
Poor diet	0.0%***	0.5%***	5.6%
Diet needs improvement	73.5	74.6	74.5
Good diet	26.5	25.1	19.9
Maximum sample size	62	322	622

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."

*** Statistically significant difference from children of nonworking mothers at the 1 percent level
** Statistically significant difference from children of nonworking mothers at the 5 percent level
* Statistically significant difference from children of nonworking mothers at the 10 percent level

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

Exhibit 4.8

Mean Intake of Food Energy, Iron, Zinc, and Dietary Fiber

	CACFP Participants with Working Mothers		Not-in-Childcare Children of Nonworking Mothers
	≤ 4 hr in CACFP Care	> 4 hr in CACFP Care	
All children age 1 to 5[a]			
Food energy:			
Mean percent of 1989 REA	95.4%	104.4%***	96.2%
Percent above 110% REA	27.4	39.5***	30.4
Percent below 90% REA	38.1	33.6***	48.4
Percent of 2001 RDA for:			
Iron	132.6	139.9	144.5
Zinc	190.2*	218.2	218.0
Percent dietary fiber recommendation[b]	115.8	132.5***	121.3
Maximum sample size	107	526	954
By income category			
Up to 185% of poverty			
Food energy:			
Mean percent of 1989 REA	98.2%	104.2%***	95.1%
Percent above 110% REA	34.3	39.0**	30.3
Percent below 90% REA	40.1	39.1**	49.4
Percent of 2001 RDA for:			
Iron	133.7	134.9	144.1
Zinc	201.9	217.1	219.9
Percent dietary fiber recommendation[b]	112.9	134.2***	116.8
Maximum sample size	75	274	559
Over 185% of poverty			
Food energy:			
Mean percent of 1989 REA	90.6%	104.6%**	97.5%
Percent above 110% REA	15.5***	38.7*	30.4
Percent below 90% REA	34.5	31.1***	47.2
Percent of 2001 RDA for:			
Iron	130.8	144.0	145.0
Zinc	170.2*	219.1	215.5
Percent dietary fiber recommendation[b]	120.8	131.2	126.8
Maximum sample size	32	252	395
By number of adults			
One			
Food energy:			
Mean percent of 1989 REA	91.2%	108.0%***	96.5%
Percent above 110% REA	24.0	46.0**	33.5
Percent below 90% REA	46.1	33.8*	45.4

Exhibit 4.8

Mean Intake of Food Energy, Iron, Zinc, and Dietary Fiber

	CACFP Participants with Working Mothers		Not-in-Childcare Children of Nonworking Mothers
	≤ 4 hr in CACFP Care	> 4 hr in CACFP Care	
Percent of 2001 RDA for:			
Iron	134.0	131.8	146.7
Zinc	171.5*	219.8	223.1
Percent dietary fiber recommendation[b]	102.8	128.8*	103.0
Maximum sample size	45	168	96
Multiple			
Food energy:			
Mean percent of 1989 REA	99.2%	102.9%**	96.1%
Percent above 110% REA	30.4	35.9*	30.0
Percent below 90% REA	30.9***	35.2***	48.8
Percent of 2001 RDA for:			
Iron	131.3	143.4	144.2
Zinc	207.0	217.6	217.3
Percent dietary fiber recommendation[b]	127.5	134.2**	123.9
Maximum sample size	62	358	858

a For dietary fiber, only children 2 to 5 years of age are included.

b Based on American Health Foundation recommendation of "age-plus-five" grams per day (Williams, 1995).

*** Statistically significant difference from children of nonworking mothers at the 1 percent level
** Statistically significant difference from children of nonworking mothers at the 5 percent level
* Statistically significant difference from children of nonworking mothers at the 10 percent level

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

Food Energy

Average food energy intake is greater for children with working mothers in CACFP care compared with not-in-care children of nonworking mothers. The difference was significant for children in care over four hours per day (104 *versus* 96 percent of 1989 REA).[54] In addition, a significantly greater share (40 percent) of CACFP children consume in excess of 110 percent of their recommended energy levels than children not in care (30 percent). Results were similar for all children regardless of income or the number of adults in the household. These findings suggest that CACFP participation alone is not sufficient to ameliorate the association between maternal employment and higher levels of energy intake among all preschool children, as discussed in Chapters 2 and 3.

[54] The 1989 REA for children age 1 to 3 is 1,300 calories per day, and for children age 4 and 5, 1800 calories.

The analysis of children's food energy intake also found that significantly fewer CACFP participants had food energy intakes below 90 percent of the REA compared with not-in-care children of nonworking mothers. The difference was significant for full-day CACFP participants (34 percent *versus* 48 percent). Again, the pattern observed persists across subgroups. Whether or not this is indicative of a positive association between CACFP participation and food energy intake is difficult to say in light of the growing problem of childhood obesity.

Iron and Zinc

The analyses of mean iron and zinc intakes (Exhibit 4.8) did not reveal any differences between CACFP children whose mothers work and not-in-care children of nonworking mothers. Both groups are consuming, on average, about 40 percent more than the RDA for iron and over twice the RDA for zinc. These high levels of nutrient intake were maintained in spite of differences in income and household composition.

Dietary Fiber

Along with iron and zinc, intake of dietary fiber among children in both groups also exceeds recommended levels. Mean dietary fiber intakes are significantly higher among CACFP participants in care more than four hours a day compared with children not in care (132 *versus* 121 percent of the recommended value).[55] Results were replicated for subgroups except among children in higher income households, where dietary fiber intake did not differ between groups.

Comparisons of Diet Quality: Soft Drinks, Added Sugar, and Fried Potatoes

Overconsumption of soda, fruit-flavored drinks, and other sweetened beverages by children is cause for concern. As noted in Chapter 2, these soft drinks contribute to higher than desirable levels of sugar intake and are low in nutrients. Excessive consumption of added sugars has been linked to increases in food energy intake, and may contribute to childhood obesity. It was therefore of interest to examine these aspects of diet quality among CACFP participants with working mothers and other children. In addition, although vegetable consumption is generally considered health-promoting, the Food Guide Pyramid (and HEI) does not currently distinguish between high-fat fried potatoes and other types of vegetables. For this reason, fried potato consumption was also assessed. Given that the CACFP meal patterns do not allow soft drinks and, instead, require milk, fruit or juice, and vegetables, it seemed likely that participants would be consuming smaller quantities of the less healthful foods examined here compared with other children.

Soda and Soft Drinks

Exhibit 4.9 shows the proportions of children who consume soda and other soft drinks in the following daily quantities: none, up to 8 fluid ounces, and more than 8 fluid ounces.[56] CACFP participants with working mothers are significantly less likely to consume any soda than not-in-care children with nonworking mothers (68 to 75 percent *versus* 61 percent did not consume soda). They

[55] If dietary fiber intake was expressed in relation to the new, higher reference values (AIs), mean intake would probably not exceed these values. The differences between CACFP participants and nonparticipants, however, would remain.

[56] Soft drinks excluding soda are fruit-flavored beverages other than 100 percent fruit juice (e.g., lemonade, fruit punch, sports drinks) and iced tea, including artificially sweetened beverages.

are also significantly less likely to consume more than 8 ounces of soda per day (3 percent *versus* 11 percent). When subgroups were examined, differences in the likelihood of consuming any soda are significant only among children in low-income and multiple adult households. CACFP participants, however, are less likely to consume larger quantities of soda than other children regardless of income or number of adults in the household.

Exhibit 4.9

Consumption of Soda and Other Soft Drinks[a]

	CACFP Participants with Working Mothers		Not-in-Childcare Children of Nonworking Mothers
	≤ 4 hr in CACFP Care	> 4 hr in CACFP Care	
All children age 2 to 5			
Soda			
None	74.6%**	68.0%*	61.1%
Up to 8 oz	22.5	29.2	27.6
More than 8 oz	2.8***	2.8***	11.3
Other soft drinks			
None	51.9	60.1*	48.5
Up to 8 oz	32.8	28.8	30.7
More than 8 oz	15.3	11.1***	20.8
Maximum sample size	107	479	696
By income category			
Up to 185% of poverty			
Soda			
None	76.9%***	73.0%***	57.2%
Up to 8 oz	19.1*	22.0**	30.1
More than 8 oz	4.0***	5.1***	12.7
Other soft drinks			
None	46.0	54.9	48.8
Up to 8 oz	41.9*	31.6	28.2
More than 8 oz	12.1***	13.5**	23.1
Maximum sample size	75	259	400
Over 185% of poverty			
Soda			
None	70.8%	63.9%	66.0%
Up to 8 oz	28.4	35.1**	24.5
More than 8 oz	0.9***	1.0***	9.5
Other soft drinks			
None	61.9	64.3**	48.1
Up to 8 oz	17.2**	26.6	33.8
More than 8 oz	20.9	9.1**	18.1
Maximum sample size	32	220	296

Exhibit 4.9

Consumption of Soda and Other Soft Drinks[a]

	CACFP Participants with Working Mothers		Not-in-Childcare Children of Nonworking Mothers
	≤ 4 hr in CACFP Care	> 4 hr in CACFP Care	
By number of adults			
One			
Soda			
None	81.0%	72.6%	68.1%
Up to 8 oz	14.2	25.4	18.2
More than 8 oz	4.9*	2.0***	13.7
Other soft drinks			
None	56.8	51.7	49.5
Up to 8 oz	33.0	30.3	30.9
More than 8 oz	10.2	18.1	19.6
Maximum sample size	45	157	74
Multiple			
Soda			
None	69.0%	65.9%	60.2%
Up to 8 oz	30.0	30.9	28.9
More than 8 oz	1.0***	3.2***	11.0
Other soft drinks			
None	47.5	63.8**	48.3
Up to 8 oz	32.6	28.2	30.7
More than 8 oz	19.9	8.0***	21.0
Maximum sample size	62	322	622

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

*** Statistically significant difference from children of nonworking mothers at the 1 percent level
** Statistically significant difference from children of nonworking mothers at the 5 percent level
* Statistically significant difference from children of nonworking mothers at the 10 percent level

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

The patterns of consumption for soft drinks (other than soda) differ from those for soda in three respects. First, more children age 2 to 5 in both groups drink these beverages than they do soda (50 *versus* 37 percent; data not shown). Second, only CACFP children with working mothers who participate more than four hours per day are less likely to consume soft drinks than not-in-care children of homemakers (60 *versus* 48 percent; $p<0.10$). The amount of time in care also makes a difference in the share of children who consume in excess of 8 ounces of these beverages a day: 11 percent of CACFP participants *versus* 21 percent of not-in-care children of nonworking mothers. Finally, CACFP participants in higher income (but not low-income) households are significantly less likely to

consume other soft drinks in any quantity than children not in care. There were no differences between the groups among children in single-adult households.

Added Sugar

Results of the analysis of children's intake of added sugar (in teaspoons per day) are shown in Exhibit 4.10. Mean amounts are presented for total added sugar and added sugar from soda and other soft drinks. Reference values (maximums) for total added sugars, which are provided by USDA's Food Guide Pyramid, are 6 teaspoons a day for children 2 through 6 years of age, and two-thirds that amount (4 teaspoons) for younger children (Kennedy *et al*., 1995).

Exhibit 4.10

Mean Added Sugar Intake (teaspoons per day)

	CACFP Participants with Working Mothers		Not-in-Childcare Children of Nonworking Mothers
	≤ 4 hr in CACFP Care	> 4 hr in CACFP Care	
All children age 2 to 5			
Added sugar from all sources	13.0	12.3***	14.3
From soda and other soft drinks	3.4***	2.9***	5.2
Maximum sample size	107	479	696
By income category			
Up to 185% of poverty			
Added sugar from all sources	13.7	12.0**	13.5
From soda and other soft drinks	3.6***	3.3***	5.6
Maximum sample size	75	259	400
Over 185% of poverty			
Added sugar from all sources	12.0**	12.5***	15.3
From soda and other soft drinks	3.1*	2.6***	4.7
Maximum sample size	32	220	296
By number of adults			
One			
Added sugar from all sources	12.6	12.6	13.8
From soda and other soft drinks	3.3***	3.5***	5.7
Maximum sample size	45	157	74
Multiple			
Added sugar from all sources	13.4	12.1***	14.4
From soda and other soft drinks	3.5***	2.7***	5.2
Maximum sample size	62	322	622

*** Statistically significant difference from children of nonworking mothers at the 1 percent level
** Statistically significant difference from children of nonworking mothers at the 5 percent level
* Statistically significant difference from children of nonworking mothers at the 10 percent level

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

For those in care for more than four hours a day, CACFP participants with working mothers consume significantly less total added sugar than not-in-care children with nonworking mothers (12 *versus* 14 teaspoons per day). The added sugar contribution from soda and other soft drinks is significantly smaller for CACFP children regardless of time spent in care (3 *versus* 5 teaspoons). These patterns were consistent across all income and household composition subgroups.

Fried Potatoes

Children's consumption of fried potatoes, including French fries, tater tots, and hash browns, was measured in "servings," as defined by the Food Guide Pyramid. A serving of fried potatoes (and other cooked vegetables) is the equivalent of ½ cup; for children age 2 and 3 years, a serving is two-thirds of this amount. Exhibit 4.11 shows the results for fried potato consumption in the context of the total number of other (non-fried potato) vegetable servings consumed.

Exhibit 4.11
Consumption of Fried Potatoes and Other Vegetables (servings per day)

	CACFP Participants with Working Mothers		Not-in-care Children with Nonworking Mothers
	≤ 4 hr in CACFP Care	> 4 hr in CACFP Care	
All children age 2 to 5			
Fried potatoes	0.3	0.4	0.4
Other vegetables	1.6	1.9***	1.6
Maximum sample size	107	479	696
By income category			
Up to 185% of poverty			
Fried potatoes	0.3	0.3	0.4
Other vegetables	1.6	2.2***	1.6
Maximum sample size	75	259	400
Over 185% of poverty			
Fried potatoes	0.3	0.4	0.4
Other vegetables	1.6	1.7	1.5
Maximum sample size	32	220	296
By number of adults			
One			
Fried potatoes	0.2	0.3	0.4
Other vegetables	1.4	2.0	1.6
Maximum sample size	45	157	74
Multiple			
Fried potatoes	0.4	0.4	0.4
Other vegetables	1.9	1.9**	1.6
Maximum sample size	62	322	622

a A serving of vegetables is defined in the Food Guide Pyramid as 1 cup of raw leafy vegetables; ½ cup of other vegetables, cooked or chopped raw; or ¾ cup of vegetable juice.

*** Statistically significant difference from children of nonworking mothers at the 1 percent level
** Statistically significant difference from children of nonworking mothers at the 5 percent level
* Statistically significant difference from children of nonworking mothers at the 10 percent level

Note: The low 41 percent response rate to the 24-hour recall portion of the ECCCS on which these estimates are based raises concerns of potential bias. In-CACFP-care energy intake does not significantly differ between respondents and nonrespondents (see Appendix D), but whether their out-of-care energy intake systematically differs cannot be determined. Due to this uncertainty, we recommend that these data be interpreted with caution.

There is no difference in consumption of fried potatoes between CACFP children with working mothers and not-in-care children with nonworking mothers. Both groups consume, on average, less than one-half serving of fried potatoes per day. Mean intake of vegetables other than fried potatoes among CACFP participants in care more than four hours is significantly greater than for children not in child care (1.9 *versus* 1.6 servings). Although this represents an increase of less than one-half serving overall, the difference among low-income children is somewhat more substantial (about 0.6 servings). Fried potatoes comprise a larger share of total vegetable intake among not-in-care children of nonworking mothers than CACFP children whose mothers work.

Summary

The results presented in this chapter suggest that CACFP participants' diets, on average, meet daily recommendations for food energy, protein, vitamins A and C, iron, zinc, calcium, cholesterol, and dietary fiber. They also show that meals and snacks consumed in CACFP care make a substantial and positive contribution to these children's total dietary intake. The contribution of the CACFP to participants' diets does not vary much by type of care (Head Start, child care centers, or family child care homes), except among school-age children. Six-to-10-year-olds consume a smaller share of their food energy and iron needs from CACFP meals and snacks if cared for in child care centers *versus* family child care homes. This can be explained by the higher likelihood that children in homes are offered breakfast and lunch compared with centers, where they are more likely to be offered snacks (Fox *et al.*, 1997). Regardless of type of care, however, CACFP participants age 6 to 10 consume diets that meet recommendations for most nutrients.

CACFP participants age 3 to 10, like other children of the same age (USDA/ARS, 1999), consume, on average, somewhat more than the *Dietary Guidelines'* recommended levels of total and saturated fat, and more sodium and less carbohydrate than the NRC-recommended amounts. CACFP meals and snacks do not contribute disproportionately to their daily intake of any of these dietary components, although they do provide more than the recommended level of saturated fat (mean of about 13 percent of food energy). Continued efforts to educate providers and provide tools to assist them in serving lower fat and lower sodium meals and snacks seem warranted. In addition, USDA may want to consider periodic nutrient analysis of providers' menus to help target menu planning guidance appropriately.

The analyses suggest that preschool children (age 2 to 5) in CACFP whose mothers work or are in school have better diets than children cared for by their own mothers who do not work outside the home. An association was found between program participation and better overall diet quality (more fruit, milk, and variety, and less total fat); reduced likelihood of food energy consumption below 90 percent of the average requirement; and lower levels of soda, other soft drinks, and added sugars. The differences especially favor children in low-income households, suggesting that the target population is benefiting from the CACFP.

This study was also interested in the extent to which CACFP might dampen any negative effects of maternal employment on children's nutrition. In Chapters 2 and 3, it was found that preschool children (age 2 to 4) with full-time working mothers tended to have diets of **higher** quality overall than their counterparts with homemaker mothers. These children did worse than children of

homemaker mothers on overconsumption of food energy, sodium, soda, and added sugars. Results in this chapter suggest that CACFP care tends to moderate the effects of mother's work on preschool children's overconsumption of soda and added sugars, but does not moderate the effects on food energy and sodium intake. Other potentially positive effects of CACFP care for preschool children of full-time working mothers include greater fruit and milk consumption, lower total fat intake, lower likelihood of "poor" diet rating, and, for full-day care only (more than 4 hours), higher likelihood of "good diet" rating and greater consumption of vegetables excluding fried potatoes. These were outcomes for which CACFP preschoolers did significantly better than not-in-care children, but there were no differences for all preschoolers by maternal employment.

These analyses suggest that the CACFP is making a substantial and positive contribution to the diets of preschool children with working mothers. This study cannot prove, however, that CACFP is what makes the difference in their diets. An alternative explanation is that the differences in nutrition outcomes are due to compositional differences between the samples of children (Exhibit 4.5). To investigate this possibility, a regression analysis controlling for all of the measured characteristics of the children and their families was conducted. Results of this analysis confirmed the findings of better diet quality among CACFP participants.

Nonetheless, selection effects cannot be ruled out. Although controlling for measured characteristics (child age, gender, race/ethnicity, hours in care, household income and composition, mother's education, and region) did not alter the results, it may be that families of preschoolers that use CACFP care have other advantages over families of preschoolers not in care that are associated with better nutrition outcomes. For example, it may be that, in consideration of the difficulties in combining work and family responsibilities, only the most energetic and focused women who are mothers of preschoolers choose to work.

Another possible factor is the difference in data collection methodologies between the two data sources. It seems likely that underreporting of food intake would have been limited to out-of-care consumption for the CACFP sample, because data for meals consumed in care were collected by direct observation. On the other hand, with both the child and parent present for the dietary interview, underreporting may not have been a significant problem for the CSFII sample.

As noted in the executive summary, in the data sources, and throughout the CACFP tables, only 41 percent of the 24-hour recall sample of CACFP children, on which results in this chapter are based, responded to the survey. Although energy intake patterns of the respondent children and other children observed while eating in CACFP facilities were very similar (see Appendix D), it is possible that nonrespondents could have systematically different out-of-CACFP-care dietary intake patterns than respondents. USDA Food and Nutrition Service therefore recommends that analyses of these data should not be considered as representative of CACFP participants or of the impact of the program.

Regardless of the potential limitations, these findings are interesting and worth pursuing further, ideally with a prospective, experimental design.