Univariate Analysis

Univariate statistics were used to examine the characteristics and the nutrient intake of the three groups of children—WIC recipients, income-eligible nonrecipients, and income-ineligibles. It is recommended that the calculation of standard errors for descriptive statistics based on the CSFII take into account its complex sample design (USDA 1998a). As a result, this analysis used the SURVEYMEANS procedure in Version 7 of SAS to produce survey population means and estimates of their variances (An and Watts 1998).[12]

Characteristics of Children by WIC Status

The demographic and socioeconomic characteristics of children are shown in table 1. In general, WIC recipients were not significantly different from the group of income-eligible nonparticipating children. However there were several notable exceptions.

WIC recipients, relative to the group of nonparticipating WIC eligibles, were significantly more likely to be 1 year of age, and significantly less likely to be 4 years of age. These findings are in agreement with other studies that have shown that the participation of children in WIC falls as age increases.[13] When resources are not sufficient to serve all eligible WIC applicants, local WIC clinics use a priority system in which enrollees with a non-medical dietary risk are considered a low priority. Within that low priority, many State agencies subprioritize, making older children the lowest priority.

Children participating in WIC were also more likely to live in households that received food stamps than were income-eligible nonrecipient children. Over half (55 percent) of all WIC children participated in the Food Stamp Program, compared with only 32 percent of eligible nonrecipients.

Both WIC recipients and income-eligible nonrecipients were significantly different from the group of income-ineligible children in a number of characteristics. Income ineligibles were more likely to be white, and less likely to be black or Hispanic. As expected, WIC recipients and income-eligible nonrecipients, relative to income ineligibles, were worse off in most measures of socioeconomic status including income, percent of poverty, homeownership, and cash assets. WIC recipients and income-eligible nonrecipients were also more likely to live in a single-headed household, and in a household whose head had fewer years of schooling and who was less likely to have graduated from high school.[14]

Nutrient Intake of Children by WIC Status

By providing participants nutritious, supplemental food and nutrition education, participation in WIC may increase the nutrient intake of children in any of three ways: (1) by increasing the amount of food consumed; (2) by substituting foods of higher nutritional quality (i.e., more nutrient-dense foods) for foods of lower nutritional quality; or (3) by empowering participants (or their parent or guardian) to choose a healthy diet. To more fully describe the distribution of nutrient intake among the three groups of children, we used two different measures—mean nutrient adequacy ratios and the percentage of children who did not meet the RDA.

The nutrient adequacy ratio is the nutrient intake of an individual divided by the 1989 Recommended Dietary Allowance (RDA) for that individual and is expressed as a percent (in this study, an individual's nutrient intake refers to the *average of the 2 days*). RDAs are often used to compare dietary quality among population subgroups. RDAs "represent the amounts of nutrients that are adequate to meet the needs of most healthy people. Although people with average nutrient requirements likely eat adequately at levels below the RDAs, diets that meet RDAs are almost certain to ensure intake of enough essential nutrients by most healthy people" (USDA/U.S. Dept. of Health and

[12]This procedure uses the Taylor expansion method to calculate standard errors of estimates based on complex sampling designs.

[13]For example, a near-census of WIC participants in April 1996 found that 36 percent of all children participating in WIC were 1 year of age, 26 percent were 2 years of age, 22 percent were 3 years of age, and 16 percent were 4 years of age (USDA 1998c).

[14]In dual-headed households, the female head's years of schooling was used to represent educational background since the female head is usually the primary meal preparer.

Table 1--Socioeconomic and demographic characteristics of children by WIC status

	All children (n=2,280)	WIC recipients (n=439)	Income-eligible nonparticipants (n=767)	Income ineligibles (n=1,074)
Individual characteristics				
		Percent		
Race/ethnicity:				
White (non-Hispanic)	62.7	44.4[1]	49.2[1]	79.0
Black (non-Hispanic)	16.6	29.2[1]	22.5[1]	7.8
Hispanic	15.2	19.6[1]	23.1[1]	8.2
Other (non-Hispanic)	5.4	6.8	5.2	5.1
Age:				
1 year	24.2	33.6[1,2]	19.4[1]	23.8
2 year	24.9	28.8	23.5	24.4
3 year	24.5	20.5	26.1	25.0
4 year	26.4	17.2[1,2]	30.9	26.9
Sex:				
Male	50.9	50.9	52.0	50.1
Female	49.1	49.1	48.0	49.9
Household characteristics				
		Mean		
Annual income	$38,656	$17,943[1]	$18,967[1]	$59,917
Percent of poverty	194.1	103.8[1]	111.5[1]	284.7
		Percent		
Own their home	55.3	30.5[1]	34.2[1]	79.2
Have assets over $5,000	34.3	4.7[1]	8.5[1]	63.3
		Persons		
Household size	4.4	4.7[1]	4.7[1]	4.1
		Percent		
Receive Food Stamps	21.0	54.9[1,2]	32.5[1]	0.1[3]
		Dollars		
Monthly value of Food Stamps	262	263	260	NA
Region:		*Percent*		
Northeast	18.8	18.1	14.8	21.7
South	33.7	34.6	32.3	34.3
Midwest	23.9	27.0	22.2	23.9
West	23.6	20.4	30.6	20.1
Urbanization:				
Central city	34.1	40.9	39.4	27.9
Suburbs	47.5	34.4[1]	40.5[1]	57.4
Rural	18.3	24.7[1]	20.1	14.6
Household structure:				
Dual headed	80.4	61.8[1]	69.7[1]	94.6
Single head	19.6	38.2[1]	30.3[1]	5.4
		Years of schooling		
Education of head	12.7	11.1[1]	11.5[1]	14.1
		Percent		
Completed high school	82.0	65.6[1]	70.6[1]	95.8

Notes: Weighted data.
NA=Not applicable.
[1]Significantly different from income ineligibles at the 95-percent confidence level.
[2]Significantly different from income eligible nonparticipants at the 95-percent confidence level.
[3]Households in which someone other than the child received food stamps.

Source: 1994-96 CSFII based on 2-day nutrient intake.

Human Services 1995). The RDAs for children are determined solely by age: children 1 to 3 years of age have the same RDA while children 4 to 6 years of age share a different RDA. A nutrient adequacy ratio above 100 indicates that the child's nutrient intake exceeded the RDA while a ratio below 100 indicates that the child's nutrient intake was below the RDA.

The mean nutrient adequacy ratio for all nutrients except zinc was close to or above 100 percent (indicating that average nutrient intake of the group met the RDA) regardless of WIC status (table 2). WIC recipients had greater mean nutrient adequacy ratios for all of the nutrients and energy than did the income-eligible nonparticipant group, but the differences were not statistically significant. Relative to the group of income-ineligible children, WIC recipients had significantly greater mean nutrient adequacy ratios for iron, protein, and folate. Eligible nonrecipients, on the other hand, had a significantly lower mean nutrient adequacy ratio for vitamin A than income ineligibles.

Because children with intakes below the RDA may not be adequately described by estimates of the mean, the percentage of children who did not meet the RDA was also estimated (table 2).[15] Virtually all children, regardless of WIC status, met the RDA for protein and folate. However, for some of the other nutrients, a substantial percentage of children did not meet the RDA. Nearly half or more of all children did not meet the RDA for iron, calcium, zinc, and food energy and one-third of all children did not meet the RDA for vitamin B-6. WIC recipients were significantly more likely to have met the RDA for iron than both eligible nonrecipients and income ineligibles. These results indicate that although the mean intakes of most nutrients were near or above the RDA, a substantial percentage of the children did not meet the RDA for some nutrients.

[15]Presenting information on the percentage of children with intakes below the RDA provides information about the nutrient intake of the three groups that estimates of the mean cannot provide. However, caution is required in interpreting the results, since these estimates may be biased. Because an individual's nutrient intake can vary greatly from day to day, estimates of an individual's usual nutrient intake based on only 2 days of data probably will not accurately reflect an individual's usual nutrient intake. That is, the estimate may be higher or lower than usual. For the population as a whole, the 2-day average nutrient intake that is greater than usual for some people will be offset by other people whose 2-day average is less than usual. Therefore, individual variation in nutrient intake should have no effect on the sample mean nutrient intake (although the standard deviation will be greater). However, this individual variation may affect the estimated number of people whose average nutrient intake falls below the RDA.

Table 2--Nutrient intake by WIC status

Nutrient	All children (n= 2,280)	WIC recipients (n=439)	Income-eligible nonpar-ticipants (n=767)	Income ineligibles (n=1,074)
Percent of RDA				
		Mean		
Iron	112.0	121.7[1]	110.2	109.4
	(1.34)	(3.94)	(2.00)	(1.88)
Calcium	100	102	97.3	101.2
	(1.34)	(3.50)	(1.32)	(1.97)
Vitamin C	227.5	245.6	216.9	227.7
	(4.25)	(8.85)	(6.15)	(5.94)
Vitamin A	173.7	181.6	159.2[1]	180.5
	(3.44)	(15.43)	(4.66)	(3.31)
Protein	285.2	301.9[1]	290.7	275.0
	(2.93)	(8.23)	(4.60)	(4.32)
Vitamin B-6	127.7	133.2	127.4	125.9
	(1.52)	(4.45)	(2.05)	(1.81)
Folate	344.8	371.3[1]	348.9	331.7
	(5.15)	(12.35)	(7.53)	(5.91)
Zinc	76.5	81	78.4	73.4
	(.96)	(2.56)	(1.12)	(1.38)
Food energy	98.8	101.7	99.0	97.5
	(.89)	(2.44)	(1.59)	(1.12)
Percent of children failing to meet 100 percent of the RDA				
		Percent		
Iron	48.7	40.5[1, 2]	50.1	50.9
	(1.31)	(2.56)	(1.86)	(2.05)
Calcium	55.2	54.5	56.9	54.2
	(1.39)	(3.71)	(1.70)	(2.14)
Vitamin C	19.0	15.9	22.1	18.0
	(1.24)	(2.27)	(1.89)	(1.73)
Vitamin A	24.5	24.2	29.3[1]	21.3
	(1.05)	(2.41)	(1.73)	(1.54)
Protein	1.2	0.6	1.3	1.4
	(.28)	(.44)	(.49)	(.46)
Vitamin B-6	33	30.1	34.2	33.4
	(1.37)	(3.76)	(1.91)	(1.72)
Folate	1.7	1.7	2.0	1.5
	(.31)	(.83)	(.59)	(.37)
Zinc	82.2	77.4	79.8	85.6
	(1.27)	(2.67)	(1.67)	(1.55)
Food energy	57	54.1	56.4	58.5
	(1.14)	(2.93)	(2.31)	(2.01)

Notes: Weighted data. Numbers in parentheses are the standard errors of the mean.
[1]Significantly different from the corresponding coefficient for income ineligibles at the 95-percent confidence level.
[2]Significantly different from the corresponding coefficient for income-eligible nonparticipants at the 95-percent confidence level.

Source: 1994-1996 CSFII based on 2-day nutrient intake.