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WIC Infant and Toddler Feeding Practices Study – 2: Fourth Year Report

Executive Summary

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At Westat, Janice Machado currently leads the project. Christine Borger is Principal Investigator and Deputy Director for Analysis, and Bibi Gollapudi is Deputy Director for Operations. Brenda Sun, a statistical programmer, supports the analytic work. Kathy Clingan provided data quality assurance

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Human subjects' protections for the study are overseen by 17 Institutional Review Boards (IRBs), including: Westat; state Department of Health IRBs in CA, CT, FL, GA, LA, MD, MI, NY, OH, OK, PA, SC, TN, and TX; and local IRBs at Arrowhead Regional Medical Center in San Bernardino, CA, and Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center, CA. We appreciate the effort these IRBs have made in overseeing human subjects' protections. We also appreciate the cooperation of all participating State Departments of Health in providing WIC administrative data for the study. Use of these data does not imply that the IRBs, State Departments of Health, or WIC State Agencies and sites agree or disagree with any presentations, analyses, interpretations or conclusions in this report.

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WIC ITFPS-2 Fourth Year Report Executive Summary

Key Findings:

- ***The diets of children in the Special Supplemental Nutrition Program for Women, Infant and Children (WIC) Infant and Toddler Feeding Practices Study-2 (ITFPS-2) appear as healthy as a nationally representative sample of 2- to 5-year-olds.*** On a typical day at 48 months, 88 percent of study children consume fruits including 100 percent juice, 64 percent consume vegetables, 98 percent consume grains, 85 percent consume some type of milk, and 97 percent consume meats or other proteins. The majority (82%) also consume desserts, candy, and sugar-sweetened beverages. The average 2015 Healthy Eating Index (HEI-2015) score for WIC ITFPS-2 study children (58.7) is similar to that from a national sample of 2- to 5-year-old U.S. children (60.1), indicating that the typical diet of study children is aligned with that of the typical U.S. child.
- ***For most nutrients, median nutrient intake levels meet or exceed recommended levels at age 4.*** However, median intakes of vitamins D and K and potassium are below recommended levels. Moreover, nearly 82 percent of study children have inadequate intake of vitamin D. Though median intakes of vitamin E and calcium are above recommended levels, the prevalence of inadequate intakes exceeds 25 percent for each micronutrient.
- ***Most study children have healthy weight status, but one-third are overweight or obese.*** Body Mass Index (BMI) percentiles for most (61%) study children are in the healthy range. However, 15 percent have BMI percentiles in the overweight range and 18 percent have BMI percentiles in the obese range. Five percent have BMI percentiles in the underweight range.
- ***Consistent four-year participation in WIC is associated with better diet quality.*** Children who participate with WIC through their fourth year have better diet quality as measured by HEI-2015 scores than children who leave WIC after their first year.

Overview of Study Goals and Methods

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) was established to safeguard the health of low-income pregnant and post-partum women, infants, and children who are at nutritional risk. The program was established by Congress as a pilot in 1972 under Public Law 92-433, Section 17 of the Child Nutrition Act of 1966, and made permanent in 1974.[1] The program, administered by the Food and Nutrition Services (FNS) of the U.S. Department of Agriculture (USDA), provides supplemental foods, nutrition education, including breastfeeding promotion and support, and health care referrals for low-income pregnant, non-breastfeeding and breastfeeding postpartum women and their infants and children up to age 5.

[1] U.S. Department of Agriculture, Food and Nutrition Service. About WIC's Mission. http://www.fns.usda.gov/wic/about-wic-wics-mission. Accessed September 27, 2017.

WIC ITFPS-2 is a longitudinal study designed to examine the feeding practices employed by caregivers[2] and the dietary intakes and nutrition-related outcomes of children who enrolled in WIC around the time of birth. By capturing data on caregivers and their children over the first 6 years of the child's life, the study informs a series of research questions regarding feeding practices, the association between WIC services and those practices, and the health and nutrition-related outcomes of children currently or previously receiving WIC benefits.

Caregivers were recruited as they enrolled in selected eligible WIC clinics[3] during the summer or fall of 2013. To be eligible for the study, caregivers had to be at least 16 years old, enrolling themselves or their child who was less than 2.5 months old for the first time for the pregnancy or child,[4] and speak either English or Spanish. Study participants were recruited in person from 80 sampled WIC sites across 27 states and territories nationwide. Interviews are conducted by telephone in English or Spanish.

The focus of the *Fourth Year Report* is nutrition, health, feeding practices, and WIC experience during the study child's fourth year of life. The primary data sources include the 42- and 48-month interviews, as well as the WIC administrative or health care provider data on the child's weight and height around the time of the child's fourth birthday. Whereas the 42-month interview focuses broadly on health, lifestyle, feeding practices and experiences, and childrearing practices, the 48-month interview focuses more specifically on the child's dietary intake by conducting a 24-hour dietary recall. During the interview, WIC ITFPS-2 caregivers recall all foods and beverages the child consumed on the preceding day, then associate each food and beverage with an eating occasion. Eating occasions include meals (e.g., breakfast, lunch, and dinner) as well as events in between meals (e.g., snacks).

Analyses in this report are primarily based on the 3,777 caregivers who completed at least a 1- or 3-month interview, although analyses sometimes utilize a subset of the data to address subgroups of interest or longitudinal questions. The data are weighted to represent the national population of

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[2] Over 98 percent of respondents are biological mothers. Throughout the report the terms "mother" and "caregiver" are used interchangeably.

[3] Sites were excluded for operational and design reasons, including geographic location (American Samoa, Guam, Northern Mariana Islands, and U.S. Virgin Islands), and small sites that were expected, on average, to enroll less than 30 new pregnant women/newborns per month.

[4] Caregivers could have other children receiving WIC benefits.

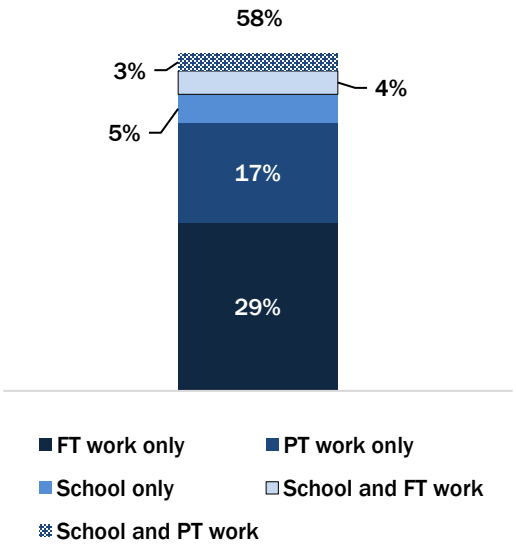
study-eligible participants. Study findings represent the characteristics, views, behaviors, and experiences of this population.

Personal and Household Characteristics of WIC ITFPS-2 Families

Work and School

By the time the study children are 42-months old, more than half (58%) of the mothers have work and/or school commitments. At 42 months, 29 percent of study mothers are working full time (FT) only, 17 percent are in working part time (PT) only, about 7 percent are working either FT or PT and going to school, and 5 percent are in school only. Figure 1 shows the percentages of WIC ITFPS-2 caregivers by their work and/or school status. In total, at 42 months, 53 percent of study caregivers are working for pay. This is similar to 49 percent working for pay at the 30-month interview (not shown).

Figure 1. Percentage of caregivers working or going to school at 42 months

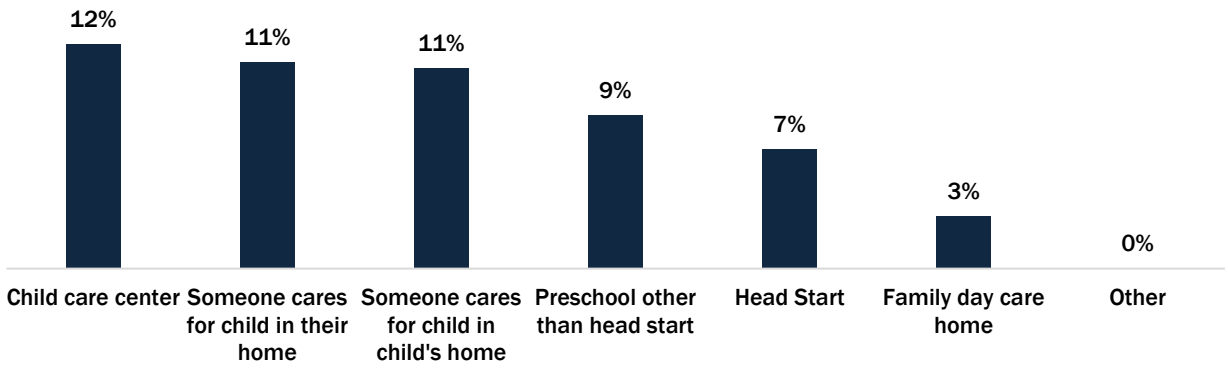


Child Care Use

The majority of study children are attending regular child care when they are 42 months old. WIC ITFPS-2 defines regular child care as an arrangement in which someone other than the child's primary caregiver or the other parent cares for the child on a regular basis. Specifically, 53 percent of children are in child care when they are 42 months old, and the most common type of arrangement is a child care center (Figure 2). This represents a shift from the previous year's findings at the 30-month interview, when the most common type of child care was having a provider care for the child in their own home (not shown). Among those children in child care, 45 percent receive the majority of their food from the child care provider while they are in care, 33 percent receive the majority of their food from their mothers, and 22 percent receive food from both the child care provider and

their mothers. Consequently, for a notable percentage of the sample, study mothers no longer provide all the food that their children eat.

Figure 2. Percentage of study children by type of child care used at 42 months

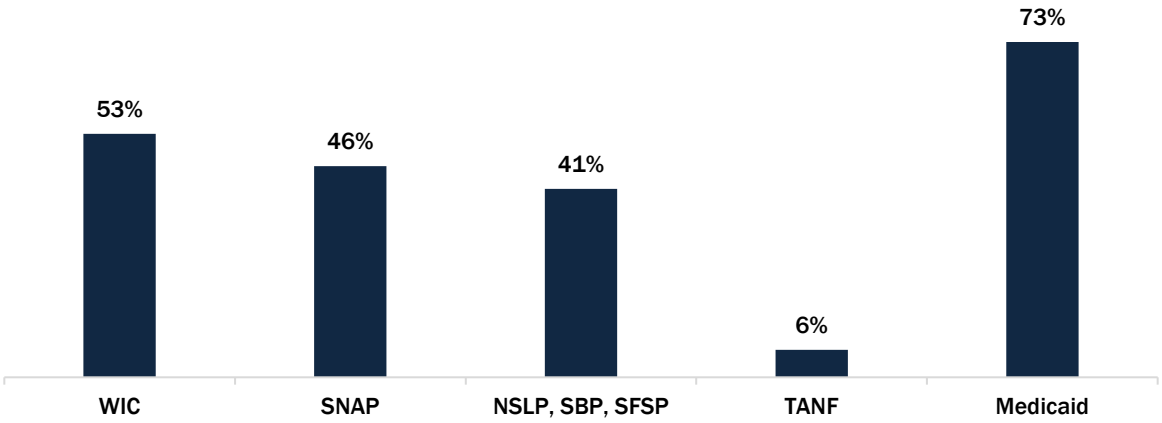


Participation in Benefit Programs at 42 Months

The study explores whether families are making use of the following benefit programs: WIC; the Supplemental Nutrition Assistance Program (SNAP); the National School Lunch Program (NSLP), School Breakfast Program (SBP), or Summer Food Service Program (SFSP); Temporary Assistance for Needy Families (TANF); and Medicaid. Figure 3 presents the percentages of study participants self-reporting that one or more of their family members use these programs when the study child is 42 months old.[5] At 42 months, just over half (53%) indicates that the mother or the study child participate with WIC. Forty-six percent of the WIC ITFPS-2 population indicates that they received SNAP benefits and 41 percent of households have students participating in school feeding programs. A relatively small percentage (6%) receive TANF, and nearly three-quarters (73%) of the WIC ITFPS-2 population indicates that someone in their family receives Medicaid.

[5] Neither income nor program participation is independently verified by the study.

Figure 3. Percentage of study participants by self-reported participation in benefit programs at 48 months



Medical Care

Based on the 42-month interview, nearly all study children have health insurance coverage and are receiving regular health care. Ninety-five percent of study mothers report that their children have a medical home. Additionally, 92 percent of study mothers report that their children had a well-visit around the child's third birthday.[6] Though the magnitude of the difference is small, WIC participation status is significantly associated with the child having a well visit around age three: 93 percent of children who received WIC at 36 months had a well visit while 90 percent of those who did not receive WIC at 36 months had a well visit.

Food Access

The majority (88%) of study participants indicate during the 42-month interview that fresh fruits and vegetables are easy to buy and plentiful in their communities. About three-quarters (75%) of study participants indicate that fresh fruits and vegetables in their communities are of high quality. However, households with very low food security are less likely to agree with these three statements, suggesting they may face unique challenges accessing fresh fruits and vegetables.

The study also explores barriers to consuming fresh fruits and vegetables. Only five percent of study participants indicate that the effort needed to prepare fresh fruits and vegetables or personal dislike

[6] Because the 48-month interview takes place close to the child's fourth birthday, not all caregivers will have had time to schedule a fourth-year visit, so the report analyzes well-visits around the child's third birthday.

of fresh fruits and vegetables are barriers to consumption. However, 27 percent of study participants indicate that cost is a barrier to consumption.

During the study child's fourth year, about 19 percent of study families live in areas of the country with low food access,[7] also known as food deserts. Bivariate analyses did not find statistically significant associations between living in a food desert and perceptions of access to fresh fruits and vegetables as measured by survey items.

Food Intake and Diet Quality

At 48 months, almost all children are eating breakfast (98%), lunch (94%) and dinner (96%) on a given day. Eight-six percent of study children consume foods and/or beverages for at least one snack occasion at 48 months, a significant change from the 83 percent of children eating at least one snack on a given day at 36 months. Among children who consume at least one snack, 2.2 snacks are consumed on average on a given day at 48 months, which is similar to the 2.3 snack eating occasions on a given day reported at 36 months.

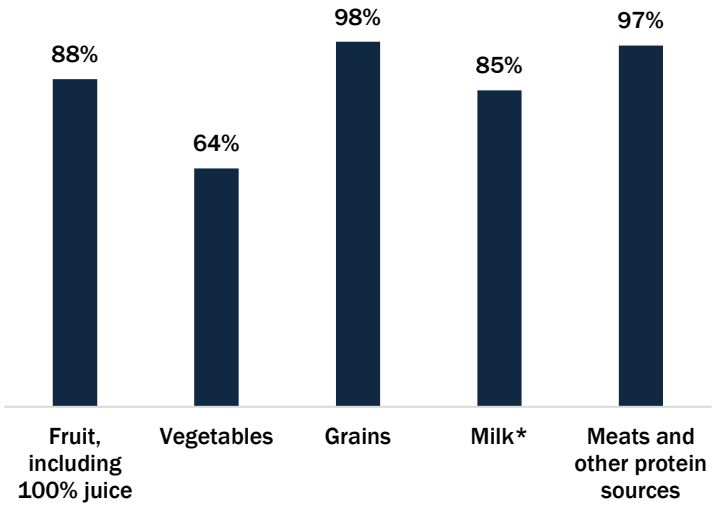
WIC ITFPS-2 study children are consuming a varied diet at age 4 years, including fruits, vegetables, dairy, grains, and meats and other proteins. For study participants receiving WIC benefits, it is important to acknowledge the contribution of the WIC food package to food intakes. Among those who participate with WIC at 42 months (57%), nearly all caregivers report that their children consume the food provided in the WIC food package: 99 percent consume fruit, 98 percent consume fruit juice, 96 percent consume vegetables, 97 percent consume breakfast cereals, and 92 percent consume whole grain bread or other whole grains.

[7] For these analyses, food deserts are defined as low-income areas with low access to supermarkets such that residents are more than a mile from a supermarket if they live in an urban area and more than 10 miles from a supermarket if they live in a rural area. Low-income areas are those "with a poverty rate of 20 percent, or greater or a median family income at or below 80 percent of the statewide or metropolitan area median family income." (U.S. Department of Agriculture Economic Research Service. (2011). Mapping Food Deserts in the United States. Retrieved from https://www.ers.usda.gov/amber-waves/2011/december/data-feature-mapping-food-deserts-in-the-us/ on May 7, 2019.)

Fruits, Vegetables, Dairy, Grains, Meats and Other Protein Sources

At 48 months, 88 percent of WIC ITFPS-2 children are consuming fruit including 100 percent fruit juice, 64 percent are consuming vegetables, 98 percent are consuming grains, 85 percent are consuming some type of milk, and 97 percent are consuming meats or other protein sources (Figure 4).

Figure 4. Percentage of study children consuming select foods at 48 months



*Includes cows, soy, rice, and other.

Analysis of fruit consumption indicates that 72 percent of children are consuming a fruit excluding 100 percent fruit juice on a given day, and nearly two-thirds (65%) are consuming 100 percent fruit juice.

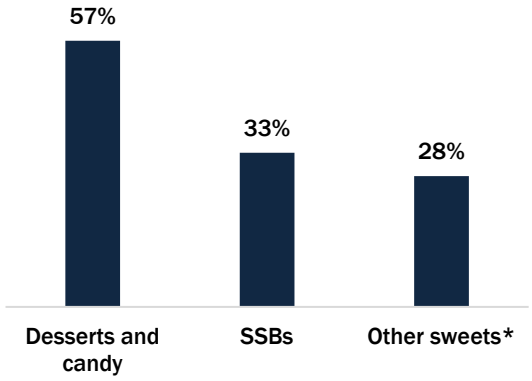
Analysis of vegetable consumption indicates that 57 percent of children are eating cooked vegetables on a given day at 48 months and 17 percent are eating raw vegetables. The top five most frequently consumed vegetables at 48 months are tomatoes, French fries or other fried potatoes, carrots, broccoli, and mashed potatoes.

Analysis of grain consumption indicates that 44 percent of study children are consuming a whole grain. Most of this consumption is in the form of whole grain breakfast cereals, which are available in the WIC food package. Thirty-eight percent of study children consume whole grain cereal, 7 percent are consuming whole grain salty snacks, and 1 percent consume whole grain bread or rolls.

Analysis of milk consumption indicates that 81 percent of study children are consuming cow's milk on a given day. Twenty-eight percent are consuming whole milk, 28 percent are consuming low-fat milk (1% milk fat), and 26 percent are consuming reduced-fat milk (2% milk fat). An estimated 2 percent are consuming skim (nonfat) milk.

Desserts and Sweets, Sugar Sweetened Beverages

Figure 5. Percentage of study children consuming desserts and candy, SSBs or other sweets on a given day at 48 months



*Includes foods such as sugar, syrup, preserves, and milk flavorings.

At 48 months, 82 percent of children are consuming desserts, candy, sugar-sweetened beverages (SSBs) or other sweets on a given day. More than half (57%) of study children are consuming a dessert or candy on a given day, 33 percent are consuming SSBs such as fruit drinks or sodas, and 28 percent are consuming other sweets (see Figure 5).

Within the SSB subgroup, fruit-flavored drinks are the most frequently consumed (22%) with soda/soft drinks in second place (7%). The percentage (33%) consuming SSB at 48 months is significantly different from the percentage (29%) consuming them at 36 months.

Indicators of Diet Quality

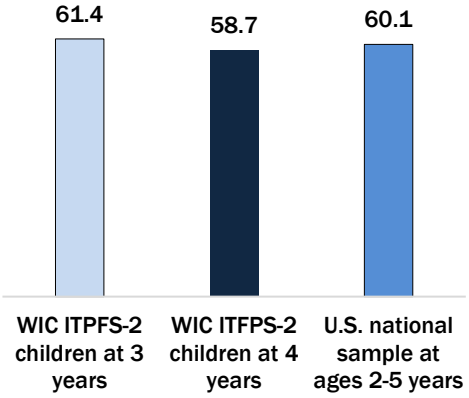
Diet quality of WIC ITFPS-2 children was primarily assessed through the 2015-Healthy Eating Index (HEI-2015)[8]. The HEI-2015 is a standard measure of diet quality for ages 2 years and above that conforms to the 2015-2020 Dietary Guidelines for Americans (DGA).[9] Using data from a 24-hour dietary recall, the HEI produces scores for dietary components and a total score. Total scores of 100 on the HEI indicate that the diet is fully compliant with DGA recommendations. The average total HEI-2015 score for 48-month old study children is 58.7. Figure 6 offers context by presenting the average HEI-2015 total score for study children at both 36-months (61.4) and 48

[8] National Cancer Institute (2018). Developing the Healthy Eating Index. February 12, 2018. https://epi.grants.cancer.gov/hei/developing.html#2015 Accessed September 15, 2018.

[9] U.S. Department of Health and Human Services and U.S. Department of Agriculture (2015). 2015–2020 Dietary Guidelines for Americans. 8th Edition. Available at http://health.gov/dietaryguidelines/2015/guidelines/. Accessed September 15, 2018.

months (58.7) as well as the average score from a U.S. national sample of 2- to 5-year-olds (60.1) (see Figure 6). Average scores indicate that the quality of the diets of study children is similar to that of those from a sample that represents U.S. children from all income groups. Nonetheless, there remains room for dietary improvement among all U.S. children.

Figure 6. Average Healthy Eating Index (HEI-2015) scores



The current study also examines how WIC ITFPS-2 children compare to the 2015-2020 DGA recommendation for added sugar intake. At 48 months, about 54 percent of study children meet the recommendation to consume less than 10 percent of calories from added sugars. This is down from 71 percent meeting this recommendation at 36 months. In multivariate analysis, participation in WIC at 48 months is significantly associated with greater likelihood of meeting the DGA recommendation for added sugars at age 4 years.

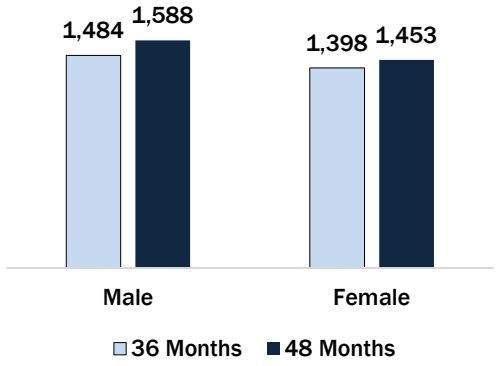
Energy and Nutrient Intake

To examine dietary intake comprehensively, the total energy (kilocalories or kcal), macronutrient, and micronutrient contents of individuals' diets are calculated, and nutrient intake is compared to existing standards or Dietary Reference Intakes (DRI). Developed by the National Academy of Sciences, Engineering, and Medicine,[10] the DRIs are nutrient standards that can be used as a point of comparison to estimate the prevalence of inadequate intake across a population.

[10]Institute of Medicine (IOM). (2000). *Dietary Reference Intakes: Applications in Dietary Assessment.* Washington, DC: The National Academies Press.

Energy Intake

Figure 7. Study children's median energy intake in kilocalories by gender at months 36 and 48



Data from WIC ITFPS-2 indicate that study children's median energy intakes continue to increase as the children age (see Figure 7). Between ages 3 and 4 years, median energy intake increases by 6 percent for male children, and by about 4 percent for female children. Median intake across both genders is 1,519 kcal/day (not shown). The 2015-2020 DGAs estimate that sedentary 4-year-old children need 1,200 kcal/day and moderately active 4-year-olds need 1,400 kcal/day.

Macronutrient and Micronutrient Intake

Macronutrients (i.e., protein, carbohydrate, and fat) are needed in relatively large quantities to provide energy and promote growth. In contrast, micronutrients (i.e., vitamins and minerals) are needed in smaller amounts, but are still essential for various physiological and metabolic processes.

When examining absolute macronutrient intake, median intake of carbohydrate exceeds the estimated average requirement (EAR), and median intake of protein exceeds the recommend dietary allowance (RDA).[11] Additionally, median percentages of energy from fat, carbohydrate, and protein all fall within the acceptable macronutrient distribution ranges at 48 months.

With the exception of vitamins D[12] and K and potassium, the median micronutrient intakes of WIC ITFPS-2 study children meet or exceed recommended levels (Table 1). The estimate of the prevalence of inadequate intakes for vitamin D is 82 percent at 48 months. Median intakes of vitamin K and potassium at 48 months are below the recommended level, suggesting inadequate

[11]For protein, RDA was used as a point of comparison instead of EAR. EAR is expressed in grams of protein per kilogram of body weight, and because the study did not obtain body weight measurements at the time of the interview, the comparison to EAR could not be made.

[12]Dietary Reference Intakes (DRIs) for vitamin D are based on an assumption of little or no sun exposure, although individuals' vitamin D levels are increased by exposure to sunlight.

intake in the population. However, for these micronutrients there is no estimated average requirement from which to estimate the exact prevalence of inadequate intake.

The prevalence of inadequate intakes of calcium and vitamin E have increased between age 36 and 48 months. Though median intake of calcium is above the recommended level, the 48-month findings indicate a sharp rise in the prevalence of inadequate intake from about 1 percent at 36 months to 27 percent at 48 months. This may reflect the 60 percent increase in the recommended level of intake from 500 milligrams per day at 36 months to 800 milligrams per day at 48 months. Additionally, though the median intake of vitamin E is above the recommended level, the prevalence of inadequate intake is up from 27 percent at 36 months to 36 percent at 48 months.

Table 1. Median micronutrient intake of study children compared to recommendations at 48 months

Micronutrients	AI/EAR for Children 4-8 Years[a,b]	Month 48	
		Median intake	Percent inadequate intakes[d]
Antioxidants			
Vitamin C (mg/d)	22[b]	94.0	0.0%
Vitamin E (mg/d)	6[b]	6.8	35.9
B vitamins			
Thiamin (mg/d)	0.5[b]	1.5	0.0
Riboflavin (mg/d)	0.5[b]	2.0	0.0
Niacin (mg/d)	6[b]	20.2	0.0
Vitamin B-6 (mg/d)	0.5[b]	1.9	0.0
Folate (µg/d)	160[b]	406.0	0.1
Vitamin B-12 (µg/d)	1.0[b]	5.1	0.0
Bone-related nutrients			
Calcium (mg/d)	800[b]	944.8	26.9
Phosphorus (mg/d)	405[b]	1,103	0.1
Magnesium (mg/d)	110[b]	213.0	0.9
Vitamin D (µg/d)	10[b]	7.6	82.1
Other micronutrients			
Vitamin A (µg RAE/d)	275[b]	675.0	0.0
Vitamin K (µg/d)	55[a]	45.4	NA
Iron (mg/d)	4.1[b]	14.3	0.0
Zinc (mg/d)	4.0[b]	9.6	0.1
Sodium (mg/d)	1,000[a,c]	2,411	NA
Potassium (mg/d)	2,300[a,c]	2,089	NA
Unweighted n		2,562	
Weighted n		439,736	

[a] Adequate Intake (AI)

[b] Estimated Average Requirement (EAR)

[c] AIs for sodium and potassium revised in 2019; previous values for sodium were 1000 mg (ages 1-3 years) and 1200 mg (ages 4-8 years); previous values for potassium were 3000 mg (ages 1-3 years) and 3800 mg (ages 4-8 years)

[d] Prevalence of inadequate intakes is estimated as the percentage of the group falling below the EAR, NA indicates no EAR is available.

Feeding Beliefs and Practices

Because the literature associates feeding practices with increased risk of child obesity, WIC ITFPS-2 explores a variety of caregiver feeding beliefs and practices. Findings indicate that feeding beliefs and practices that tend to emphasize control of the child's consumption are used regularly in the WIC ITFPS-2 population. However, in bivariate analyses conducted at 42-months, only one controlling belief is significantly associated with diet quality as measured by HEI-2015: carefully controlling how much the child eats. Children with caregivers who carefully control how much the child eats on a regular basis have significantly better diet quality than children with caregivers who do not regularly employ this feeding practice.

At 42 months, the study also probes the child's typical feeding environment, asking how frequently the family eats meals together and how often the television is on during meals. Approximately 67 percent of families report eating at least five meals together during the week. However, 8 percent of families eat together less than three times in a week. Families of full-time working mothers eat together less frequently than families of nonworking mothers, and there is a positive association between the number of times that a family eats together and diet quality. About half (52%) of study mothers report that the television is on during *most* or *some* mealtimes. In bivariate analyses, the frequency of having the television on during meals is negatively associated with diet quality, as measured by HEI-2015 total scores.

Weight and Growth

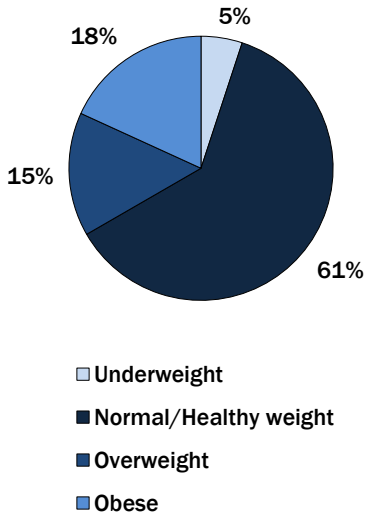
Study children are weighed and their heights are measured, either by WIC clinic staff or by a health care provider, around the time of their fourth birthday (44 to 52 months old). Study children's weight and growth outcomes are categorized into the U.S. Centers for Disease Control and Prevention recommended body mass index (BMI)-for-age classifications: underweight (less than the 5th percentile), normal/healthy weight (5th to <85th percentile), overweight (85th to <95th percentile), or obese (95th percentile and above).[13]

[13]Centers for Disease Control and Prevention (CDC) (2018). National Center for Health Statistics. https://www.cdc.gov/growthcharts/growthchart_faq.htm. Accessed May 13, 2018.

BMI-for-Age in the Fourth Year

Figure 8 presents the distribution of study children by BMI-for-age percentile group around age 4 years. A majority (61%) of study children have a normal/healthy BMI-for-age percentile. A small percentage (5%) are underweight. Fifteen percent are overweight, and 18 percent are obese.

Figure 8. Distribution of study children by fourth-year BMI-for-age percentile



Note: Percentages may not sum to 100 due to rounding

The percentage of study children in the overweight (15%) and obese (18%) categories is consistent with findings from other research. Data from the 2015-2016 National Health and Nutrition Examination Study (NHANES) show that 12 percent of all 2- to 5-year-old children in the U.S. are overweight and 14 percent are obese.[14] Because the age ranges differ and the NHANES data include children from all income brackets, it is not surprising that NHANES estimates of the percentages of overweight and obese children differ from the current study. A recent analysis of WIC Participant and Program Characteristics (PC) data from 2010-2016 indicates that among children receiving WIC in 2016, the overall prevalence of overweight (excluding obesity) at age 4 years was about 15.9 percent, and the overall prevalence of obesity was about 15.8 percent.[15] Differences in the WIC populations covered, timing of the data collection, and estimation methodology account for the discrepancy between the WIC ITFPS-2 and WIC PC estimates.

Change in BMI-for-Age over Time

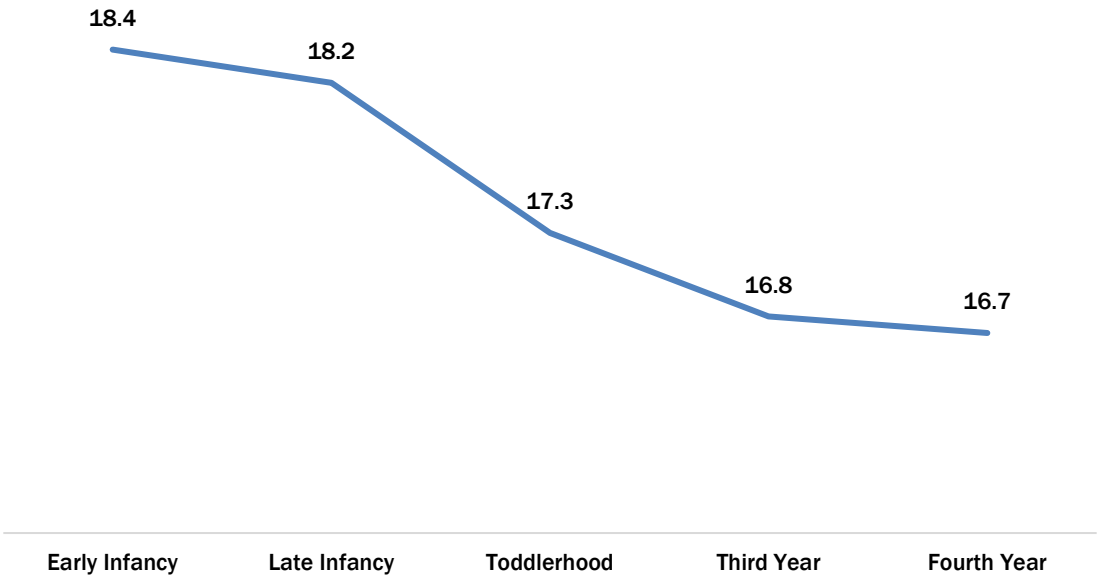
WIC ITFPS-2 collects height and weight information from study children as they age. Figure 9 presents the change in average BMI-for-age for study children over time. Average BMI-for-age declines from toddlerhood through the fourth year. This downward trend is consistent with a

[14]Skinner, A. C., Ravanbakht, S. N., Skelton, J. A., Perrin, E. M., & Armstrong, S. C. (2018). Prevalence of obesity and severe obesity in US children, 1999–2016. *Pediatrics*, e20173459.

[15]Pan, L., Freedman, D.S., Park, S., Galuska, D.A., Potter, A., and Blanck, H.M (2019). Changes in obesity among U.S. children aged 2 through 4 years enrolled in WIC during 2010–2016. *JAMA*, 321:2364–6. https://doi.org/10.1001/jama.2019.5051

healthy growth pattern. An adiposity rebound—where BMI levels off and subsequently increases—is expected sometime between ages 3 years and 8 years. Early adiposity rebound has been associated with increased risk of later obesity (Rolland-Cachera, Deheeger, Bellisle, Guilloud-Bataille, & Patois, 1984; Whitaker, Pepe, Wright, Seidel, & Dietz, 1998).

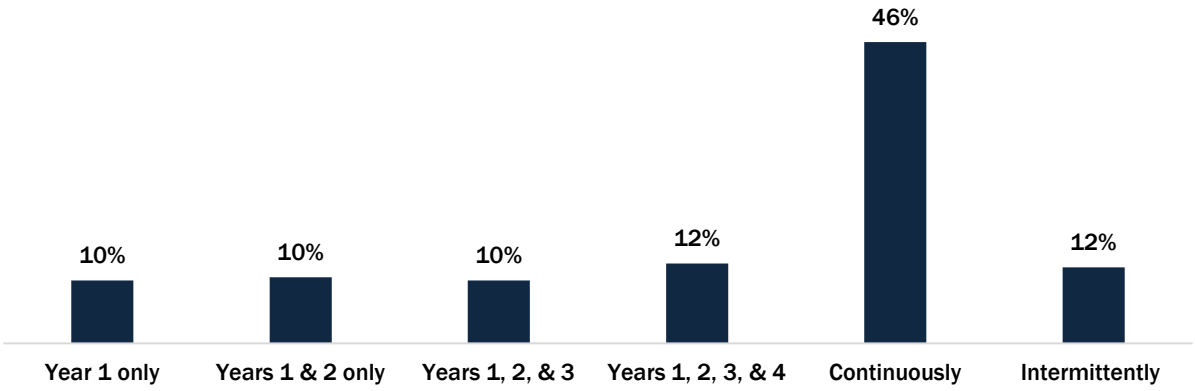
Figure 9. Average BMI-for-age over the first four years of life



WIC Participation, Retention, and Program Experience

Because study participants are not required to remain with WIC to continue participating in the study, WIC ITFPS-2 can examine patterns of participation. Figure 10 displays the distribution of WIC ITFPS-2 participants by their participation patterns. Analysis indicates that prior to the child's fourth year, about ten percent of study participants leave WIC each year and do not return. Over half (about 59%) of study participants remain with WIC into the child's fourth year. Examining this group more closely reveals that about 12 percent are on WIC into the child's fourth year but indicate that they are off WIC at some point in that year; 46 percent of study participants participate with WIC continuously over the course of the study. About 12 percent of study participants have patterns of participation that are best described as intermittent (i.e., reported participation is sporadic and irregular).

Figure 10. Distribution of WIC ITFPS-2 participants by their duration of WIC participation



Study participants who participate with WIC at 42 months are asked why they continue to participate with WIC. Most indicate that the food (93%); the education, information, and advice (94%); and the fact that WIC staff listen to their thoughts about the child's health (91%) are primary reasons they continue with WIC. The vast majority (92%) of caregivers receiving WIC at 42 months indicate that the food and education they receive through WIC are equally important. About two-thirds (67%) also indicate that talking with other parents about parenting and feeding motivates them to stay.

About 20 percent of WIC ITFPS-2 participants receiving WIC at 42 months indicate that there was a period of time over the four years of the study during which they did not receive WIC. Among this group, 68 percent experienced a temporary break of 6 months or less, 15 percent experienced a temporary break of 7-12 months, and 17 percent experienced a temporary break of more than a year.

Inconvenience is the most frequently cited reason that participants leave WIC for the first time. Forty-two percent of study participants who left for the first time during the child's fourth year cite this reason. No longer needing WIC is also a common reason for leaving. Thirty percent of study participants indicate that this is why they left WIC for the first time during the child's fourth year.

Three-quarters (75%) of those who experienced a temporary break in WIC participation over the four years of the study indicate that re-enrolling after a move was their reason for returning to WIC. Over half (55%) indicate that they missed recertification but eventually returned to WIC. These

reasons suggest that permanent departure from the program is not the initial intent for many study families.

Seventy percent of all WIC ITFPS-2 caregivers indicate that they changed their feeding practices because of something that they learned at WIC. Among those who changed their feeding practices, the most important changes cited by study participants include choosing healthier foods/nutrient-dense foods or eating a more balanced diet (39%), eating more fruits and/or vegetables (27%), and offering the right portion size (10%).

Association between WIC Participation and HEI-2015

WIC offers both nutrition education and nutritious, supplemental foods. As mentioned, 92 percent of WIC ITFPS-2 study participants who participate with WIC at 42 months indicate that education and food are equally important. Seventy-eight percent of those receiving WIC at 42 months have changed their feeding practice because of something they learned at WIC. Duration of WIC participation is significantly associated with several dietary outcomes, including HEI-2015 total and component scores, select nutrient intakes, and whether DGA recommendations for select foods are met. Multivariate regression analysis examining associations between retention in the WIC program and diet quality finds a positive relationship. Model results indicate that, all else being equal, children who participate with WIC through their fourth year have higher HEI-2015 total scores than those who leave WIC after their first year. In other words, four-year WIC participation is associated with better diet quality when compared to participation in the infant year only.