

# What are Children Eating?

## Foods Fed to Hispanic and Non-Hispanic Infants and Toddlers

Getting children to eat a healthy diet can be challenging. Across cultures and among different age groups, sweet foods are appealing, while bitter ones are more of an acquired taste. “Sweet is a cue for calories,” said Linda Bartoshuk, a taste researcher from Yale University School of Medicine. “Bitter is a cue for poison.”<sup>1</sup>

Biology isn’t the only factor—liking a certain food is also a product of culture and environment, and is usually established early in life. In a study of more than 1,000 mother-infant pairs (of children 8–16 months of age), maternal diet and acculturation were found to affect what types of foods the children ate.<sup>2</sup> This period is critical, as food preferences established from infancy through five years of age have been shown to track into later childhood and adolescence.<sup>3–5</sup>

The rising obesity epidemic impacts children of all ages and racial/ethnic groups, but currently Hispanics are affected even more than non-Hispanics. Hispanic individuals comprise the largest subgroup in the United States<sup>6</sup> and more than 20% of the nation’s school-age population.<sup>7</sup> Among preschoolers age 2–5 years, 26% of Mexican Americans, the largest subgroup of Hispanics, were overweight or at risk of overweight in 1999–2000—and this proportion increased with age.<sup>8</sup> As this population continues to grow, more health professionals are called upon to address the high prevalence of obesity, which is contributing to type 2 diabetes and metabolic disorders in Hispanic youth as well as adults.<sup>9–10</sup>

To help establish healthier eating habits, we need to understand what children are eating. In the past two decades, the two largest national nutrition surveys<sup>\*</sup> have provided some information about the diets of Hispanics, but the reports have generally focused on older children, adults, or Mexican Americans, and have not been frequently updated.<sup>11–12</sup>



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The 2002 Feeding Infants and Toddlers Study (FITS) provides a recent in-depth look at the food and nutrient intake and feeding patterns of American children between the ages of 4–24 months.<sup>13–14</sup> Recent analysis of the data<sup>†</sup> <sup>15–16</sup> helps us begin to see the differences—but also the many similarities—between Hispanics’ and non-Hispanics’ food choices, thereby providing a basis for further educating parents and caregivers.

### The Hispanic Disparity

In the FITS study, mothers of Hispanic infants and toddlers, on average, were significantly younger, had fewer years of education, and were less likely to be married than mothers of non-Hispanic infants and toddlers ( $P < .01$ ).<sup>‡</sup> (See table, “Maternal and Household Characteristics.”) Approximately one-third of the children had Spanish-speaking mothers or caretakers, of which approximately two-thirds spoke only Spanish to their children and one-third spoke both Spanish and English.

Hispanic infants and toddlers were also more likely to reside in urban areas and have lower annual household income levels ( $P < .01$ ), as well as significantly higher rates of participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

### Maternal and Household Characteristics

	Hispanics	Non-Hispanics
<b>Mother</b>		
Mean age	28 y <sup>***</sup>	30 y
<12th grade education	17% <sup>***</sup>	5%
Married	68% <sup>***</sup>	84%
Employed	53%	58%
Spanish-speaking	34% <sup>***</sup>	<1%
<b>Household</b>		
Low income*	18% <sup>**</sup>	9%
Urban	60% <sup>***</sup>	45%

\* At/below 130% of the poverty level  
 \*\*  $P < 0.05$   
 \*\*\*  $P < 0.01$

Adapted from Feeding Infants and Toddlers Study, Vol 106, Briefel R et al., FITS: Characteristics and Usual Nutrient Intake of Hispanic and Non-Hispanic Infants and Toddlers, S84–95, 2006, with permission from American Dietetic Association.

### Types of Foods and Beverages Consumed

#### Milk

Hispanic infants who were younger than one year of age were more likely to have been breastfed than non-Hispanic infants. (See chart, “Prevalence of Breastfeeding,” page 14.) The majority of the children consumed some form of milk on a given day, and nearly half of the 4–5-month-old infants consumed breastmilk. The rate of exclusive breastfeeding<sup>§</sup> among 4–5 month-olds was similar among Hispanics (14%) and non-Hispanics (18%). Infant formula was used to supplement breastfeeding for some infants and was the primary source of nutrition for others. About three-fourths of the 4–5-month-old as well as the 6–11-month-old infants were fed infant formula on a given day. Cow’s milk was typically introduced after 12 months of age; one-quarter of toddlers 12–24 months were fed reduced-fat or nonfat milk.<sup>\*\*</sup>

\* The National Health and Nutrition Examination Survey (NHANES) and the Continuing Survey of Food Intakes by Individuals (CSFII).

† The FITS includes a stratified random sample of 371 Hispanic and 2,637 non-Hispanic infants and toddlers between the ages of 4–24 months. Parents or primary caregivers were interviewed via telephone by trained interviewers between March and July 2002. Data are presented for three age groups: 4–5, 6–11, and 12–24 months. All data collection instruments and procedures were reviewed and approved by the Institutional Review Board compliance officer and Quality Assurance system at Mathematica Policy Research, Inc (Washington, D.C.).

‡ Consistent with guidelines from the U.S. Census Bureau, we collected information about the child’s race and ethnicity as separate and distinct categories and explored the possibility of creating mutually exclusive subgroups of non-Hispanic white, non-Hispanic black, and Hispanic participants.<sup>17</sup> However, 54% of Hispanic parents/primary caretakers in our study reported their child’s race as “other” or “Latino,” which limited our ability to report data for combined race/ethnicity subgroups. Therefore, we report the FITS data by Hispanic or non-Hispanic origin to study the relationship between Hispanic or Latino ethnicity and dietary intake.

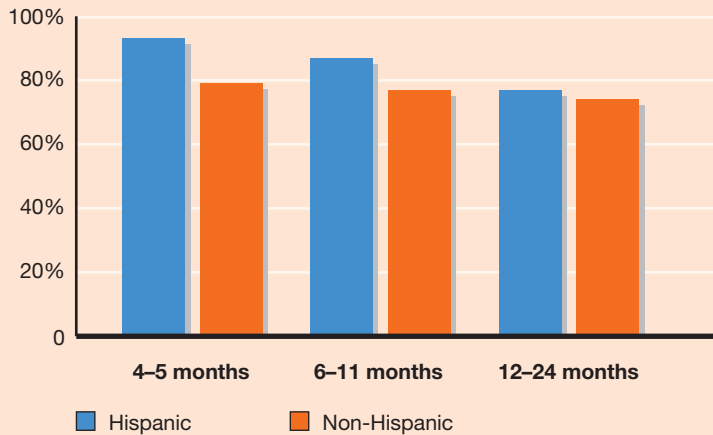
§ Exclusive breastfeeding was defined as consuming only breast milk and no supplemental infant formula, cow’s milk, or other foods (except water), as reported by the parent or primary caretaker.

\*\* Recommendations of the American Academy of Pediatrics are to delay the introduction of reduced fat or nonfat cow’s milk until 24 months of age.<sup>18</sup>

*At age 6–11 months, Hispanic infants were more likely to consume fresh fruit than non-Hispanics (30% compared to 18%) and less likely to consume pureed baby food fruit than non-Hispanics (43% compared to 58%).*

## Prevalence of Breastfeeding

Hispanic mothers of 4–5 and 6–11-month-old infants were more likely to answer yes to the question, “Did you ever breastfeed?”



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The average age of introduction of infant formula, infant cereal, pureed foods<sup>††</sup>, and cow’s milk did not vary between Hispanic and non-Hispanic toddlers, although there were large differences between individuals. For example, cow’s milk was introduced as early as two weeks, or as late as the 18<sup>th</sup> month of life.

### Grains and Grain Products

By 6 months of age, about 95% of infants consumed a grain or grain product on any given day. Infant cereals were the most commonly consumed grain-based food during the first year of life. In the second year, infant cereals were consumed by less than 20% of toddlers and a high proportion were consuming other grain-based foods such as non-infant cereals, bread, crackers, pretzels, and rice cakes.

Hispanic older infants were less likely to eat non-infant cereals (19%) compared to non-Hispanics (29%), but were more likely to be introduced to cultural foods (such as rice) at 6–11 months of age. Rice and tortilla consumption was also higher among 12–24-month-old Hispanic toddlers, who were also less likely to eat presweetened cereals and refined grains in mixed dishes—especially pizza—when compared with non-Hispanic toddlers.

### Fruits

Overall, 4–5-month-old Hispanic infants were more likely to have ever been fed pureed baby foods than non-Hispanic infants (62% vs. 51%;  $P<0.05$ ), but the consumption of pureed baby food fruit was similar (33% to 28%, respectively). Less than half the 4–5-month-olds were fed fruits or 100% fruit juices.

The majority of older infants and toddlers were eating fruits on any given day, but there were interesting findings in the form or preparation of the fruit. (See chart, “Fruit Intake Could be Improved,” page 15.) At age 6–11 months, Hispanic infants were more likely to consume fresh fruit than non-Hispanics (30% compared to 18%) and less likely to consume pureed baby food fruit than non-Hispanics (43% compared to 58%).

Although the types of fruits consumed were similar between the ethnic groups, bananas were the most popular among Hispanic infants and toddlers and non-Hispanic toddlers, whereas apples topped the list among non-Hispanic infants. Across all age groups, melons were one of the top five fruits consumed by Hispanics, but not non-Hispanics. For all groups, overall fruit consumption (100% juice or fruit) was greater than overall vegetable consumption; 85–87% of older infants and toddlers consumed fruit or 100% fruit juice on any given day.

We found no difference in the percentage of Hispanics and non-Hispanics consuming any fruit or 100% fruit juice on any given day, but both the older Hispanic infants and toddlers were significantly more likely to be consuming a sweetened beverage or fruit-flavored drink. (See chart, “Rising Sweetened Beverage Intake,” page 15.) About 13% of Hispanic infants age 6–11 months and 47% of Hispanic toddlers consumed a sweetened fruit-flavored drink such as 10% fruit drinks and lemonade (compared to 5% and 30%, respectively).

### Vegetables

About three-fourths of older infants and toddlers were consuming at least one distinct vegetable on any given day. However, that left significant numbers who were

<sup>††</sup> Pureed foods could include commercial or homemade baby foods.

The percentage of infants consuming french fries quadrupled from 6–11 to 12–24 months such that 23% of the Hispanic and 20% of non-Hispanic toddlers were likely to consume this food on any given day.



not consuming any vegetables (See chart, “Vegetable Intake Fails to Meet Recommendations,” page 15.)

There were few differences in the types of vegetables consumed by either group. The consumption of dark green, leafy vegetables such as spinach or broccoli was low (<11%) and none of the top five vegetables for either group was a dark-green vegetable. On the other hand, consumption of starchy vegetables such as potatoes, corn, and peas and non-starchy vegetables such as tomatoes increased with age. In fact, the percentage of infants consuming french fries quadrupled from 6–11 to 12–24 months such that 23% of the Hispanic and 20% of non-Hispanic toddlers were likely to consume this food on any given day.

There were few differences as to overall consumption of any raw or cooked vegetables, but there were some differences for certain vegetables. For those toddlers consuming carrots, non-Hispanics were significantly more likely to consume them cooked than raw (61% and 28%), whereas Hispanic toddlers were as likely to eat them cooked as raw (43% and 48%, respectively). For those eating tomatoes, 60% of Hispanics age 6–11 months consumed them as fresh, whereas 72% of non-Hispanics ate them in their cooked form.

### Meats or Other Protein Sources

Meats and other foods high in proteins generally appeared in the infants’ diets after six months of age. Both groups consumed proteins in the form of non-baby food meat, cheese, eggs, baby food dinners, and mixed dishes with meat or other protein source. Poultry was the most common type of meat. By 12 months of age, beef was the second most commonly consumed meat among Hispanic toddlers, whereas non-Hispanics preferred hotdogs, sausages, and cold cuts.

Hispanic infants age 6–11 months were more likely to eat soups and less likely to eat baby food dinners than non-Hispanics. Hispanic toddlers were more likely to be eating soups as well as beans and peas compared to non-Hispanic toddlers.

### Sweets

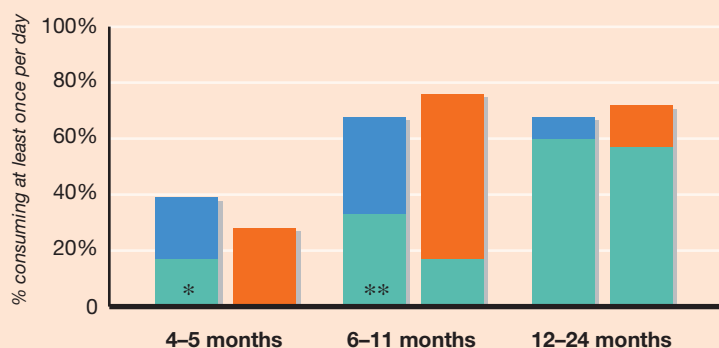
Consumption of sweet-tasting foods or beverages increased steadily with age; by the second year of life nearly 9 out of 10 toddlers consume at least one such

## Intake of Juice, Fruits and Vegetables

Hispanic Non-Hispanic Fresh Fruit

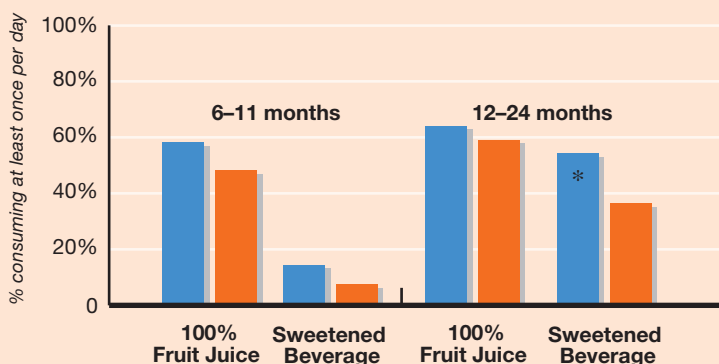
### Fruit Intake Could be Improved

Three out of 10 older infants and toddlers do not consume any fruit (excluding 100% fruit juices).



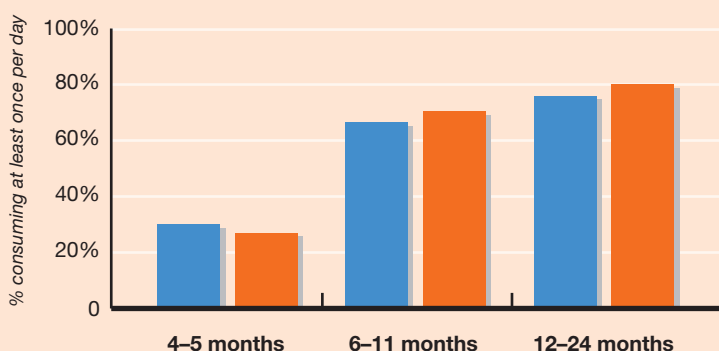
### Rising Sweetened Beverage Intake

Hispanic toddlers are more likely to consume sweetened beverages.



### Vegetable Intake Fails to Meet Recommendations

Substantial proportions of both Hispanic and non-Hispanic infants and toddlers did not eat any vegetable in a day.



\* P<0.05  
\*\* P<0.01

Adapted from Feeding Infants and Toddlers Study, Vol. 106, Mennella J et al. Feeding Infants and Toddlers Study: The Types of Foods Fed to Hispanic Infants and Toddlers. J Am Diet Assoc. 2006;106:S96–S106.

Although infants prefer sweet-tasting foods in general, an individual's preference for the level of sweetness may vary, depending on genetic, cultural, and environmental factors and liberal use of sweetened foods in early childhood.



item on any given day. (See chart, “Consumption of Sweets,” page 17.) Hispanic infants between the ages of 6–11 months were significantly more likely to be consuming baby cookies and fruit-flavored drinks than non-Hispanics. This greater likelihood of consuming sweetened beverages was also evident among Hispanic toddlers. Salty snacks, on the other hand, were not generally a part of the diet until after 12 months of age. One of five toddlers consumed a salty snack such as potato chips, popcorn, cheese curls, tortilla chips, or corn chips on any given day.

The FITS findings on fresh-fruit consumption (higher among Hispanic infants at an earlier age) and fruit-flavored beverages (consumed at 6–24 months) is consistent with previous reports that fruit was the predominant choice for first foods for infants living in several regions in Mexico.<sup>19–20</sup> Sweetened drinks were also popular remedies used to prevent or treat colic among Mexican infants.<sup>21</sup> Although infants prefer sweet-tasting foods in general, an individual's preference for the level of sweetness may vary, depending on genetic, cultural, and environmental factors and liberal use of sweetened foods in early childhood.<sup>22–24</sup>

### Energy Intake Higher Than Requirements<sup>††</sup>

There were no significant differences in usual energy intake between Hispanic and non-Hispanic infants and toddlers. The mean and median usual intakes of energy, as well as the estimated percentiles of the usual energy intake distribution, were greater than the estimated energy requirements (EERs) for both groups.

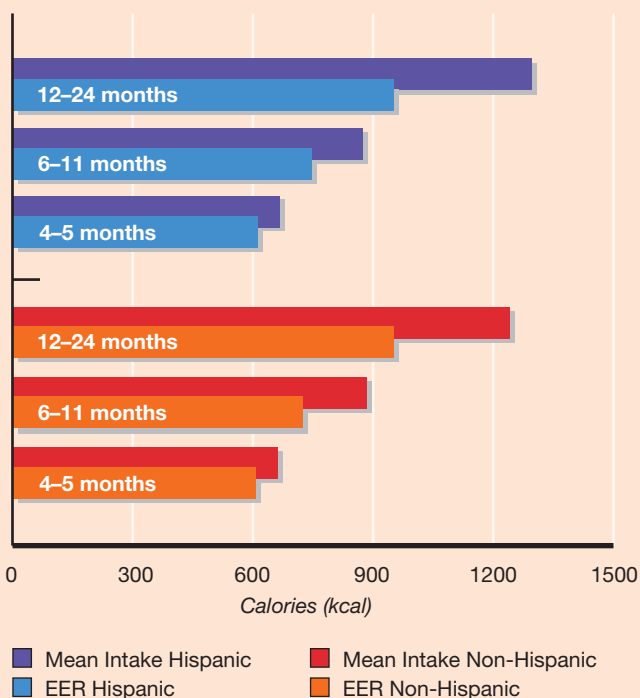
For infants 4–5 months of age, mean usual energy intake was approximately 9% more than the mean EER. For infants 6–11 months, it was 17% more for Hispanics and 22% more for non-Hispanics, and for toddlers 12–24 months, it was 36% more for Hispanics and 31% more for non-Hispanics.

To evaluate the relationship between acculturation and diet, we also assessed usual mean energy and

<sup>††</sup> Energy and nutrient intakes were assessed using the Dietary Reference Intakes (DRIs). Energy intakes were assessed in relation to estimated energy requirements, which account for the child's age, weight, and physical activity level.<sup>25</sup>

### Energy Intakes Exceed Requirements

The mean and median usual intakes of energy, as well as the estimated percentiles of the usual energy intake distribution, were greater than the estimated energy requirements (EERs) for both Hispanic and non-Hispanic children.



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*The FITS analysis suggests that Hispanic toddlers consume a higher percentage of energy from carbohydrates and fat outside the acceptable macro-nutrient distribution ranges than non-Hispanics. Education to improve food choices when infants transition to toddlerhood is especially important for Hispanic mothers and caretakers.*



nutrient intake among Hispanic infants and toddlers of English-speaking and Spanish-speaking caretakers. Mean usual energy intake was not significantly different between the two groups, suggesting that more acculturated Hispanic toddlers (i.e., in English-speaking homes) may consume diets that are higher in energy with a higher percentage of energy from carbohydrate (56% vs. 52%) compared with Hispanic toddlers in Spanish-speaking homes. The FITS data suggest that further research in this area is warranted.

## Nutrient Intake<sup>§§</sup>

### Macronutrients

Among both groups of infants age 6–11 months, there were no significant differences in the usual mean intake (in grams) or percentage of energy from fat, carbohydrate, or protein. Among toddlers age 12–24 months, the usual intake of energy from fat was 31% among Hispanics compared with 33% among non-Hispanics. In addition, approximately 46% of Hispanic toddlers and 36% of non-Hispanic toddlers had a usual intake of fat outside the acceptable macronutrient distribution range of 30%–40%.

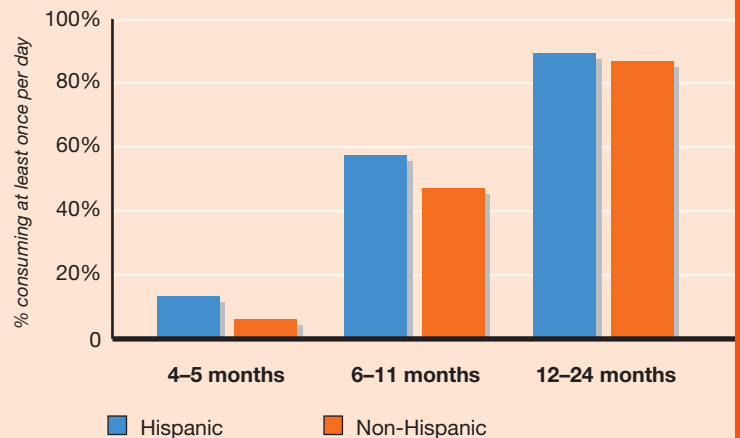
Similarly, whereas differences in mean values were not dramatically different, the usual intake of energy from carbohydrate was significantly greater among Hispanic (56%) than non-Hispanic toddlers (53%) ( $P < .01$ ). Approximately 15% of Hispanic toddlers and 11% of non-Hispanic toddlers had a usual intake of carbohydrate outside the acceptable macronutrient distribution range of 45%–65%.

Protein accounted for 15% of energy among both groups. Less than 5% had usual intakes outside the acceptable macronutrient distribution range of 5–20%.

In NHANES III, Mexican-American toddlers age 1–2 years had a mean intake of 34% of energy from fat and 52% of energy from carbohydrate.<sup>28</sup> Zive and colleagues found that Mexican-American children consumed less total energy than other children, but had a higher percentage of energy from fat.<sup>29</sup> The FITS analysis suggests that Hispanic toddlers consume

## Consumption of Sweets

The consumption of sweet-tasting foods and beverages increased steadily with age so that nearly all toddlers were ingesting sweetened items at least once on any given day.



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a higher percentage of energy from carbohydrates and fat outside the acceptable macro-nutrient distribution ranges than non-Hispanics, indicating that nutrition education to improve food choices when infants transition to toddlerhood is especially important for Hispanic mothers and caretakers.

Although mean energy intakes from beverages and the major food groups were not statistically different by Hispanic ethnicity, the FITS data suggest that energy intake related to sweetened beverages and carbohydrate intake need to be studied further in relationship to Hispanic ethnicity and cultural preferences. We know from other data sources that Hispanic preschoolers are at increased risk of overweight,<sup>30–31</sup> and sweetened beverages are one source of energy that can be targeted for nutrition education to improve dietary patterns.

### Micronutrients

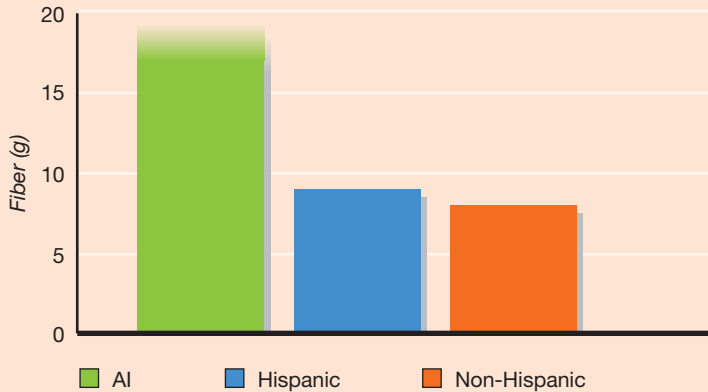
Our analysis of micronutrient intakes revealed that both Hispanic and non-Hispanic infants and toddlers consumed nutritionally adequate diets and were similar in the percentage using dietary supplements

<sup>§§</sup> Nutrient calculations were performed using the Nutrition Data System for Research (NDS-R) software. Nutrient intake included intake from foods, beverages, breast milk, and dietary supplements. Additional details about the FITS dietary data collection, coding, and analysis were reported by Devaney and colleagues<sup>26</sup> and Ziegler and colleagues.<sup>27</sup>

*Hispanic toddlers had significantly higher usual mean intakes of vitamins A, C, and E; folate; potassium; and fiber; and significantly lower usual mean intake of vitamin D than non-Hispanics. However, mean intakes for vitamin D, calcium, potassium, and sodium exceeded the AI in both groups.*

## Low Fiber Intake

Fiber intakes for both Hispanic and non-Hispanic toddlers are lower than recommendations.



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(18% in both groups). The relatively high micronutrient intakes correspond to reported energy intakes, and to some extent, infant formula use.

Comparing the mean usual intake to the Adequate Intake (AI), Hispanic and non-Hispanic infants' diets were adequate for vitamins and minerals. There were no significant differences in mean usual intake.

At age 6–11 months, for most nutrients (except iron), the 10th percentile of the usual intake distribution either equaled or exceeded the AI for both groups. For iron, the estimated prevalence of inadequacy was 5% for Hispanics and 8% for non-Hispanics. Approximately 5% of both groups had an inadequate zinc intake. Comparing usual mean intakes, Hispanics have significantly lower intakes of calcium ( $P<.05$ ) and vitamin E ( $P<.01$ ) and a significantly higher intake of sodium compared with non-Hispanics (mean of 647 mg to 476 mg per day,  $P<.01$ ).

Hispanic toddlers had significantly higher usual mean intakes of vitamins A, C, and E; folate; potassium; and fiber; and significantly lower usual mean intake of vitamin D than non-Hispanics. However, mean intakes for vitamin D, calcium, potassium, and sodium exceeded the AI in both groups. The prevalence of nutrient inadequacy was low—less than 1% for most nutrients in both groups, 2% for phosphorus and zinc in Hispanic toddlers, and 3% for folate in non-Hispanic toddlers. For vitamin E, the estimated proportion with inadequate intakes was 39% among Hispanics and 50% among non-Hispanics. Mean usual intake of fiber was 9 grams per day for Hispanics and 8 grams per day for non-Hispanics ( $P<.01$ ). Even the 90th percentile of usual fiber intake was less than the AI of 17 grams of fiber per day (see article on page 2 for more information on fiber intake).

For nutrients with Tolerable Upper Intake Levels (ULs), the percentage with usual nutrient intakes exceeding the UL was less than 1% for most nutrients, except for vitamin A, sodium, and zinc. Approximately 46% of Hispanic toddlers and 35% of non-Hispanic toddlers had usual intakes exceeding the UL for vitamin A. For zinc, the respective values were 47% of Hispanics and 40% of non-Hispanics. A little more than half of both groups exceeded the UL for sodium.

## Categorization of Food Groups

Foods and beverages were categorized by major food groups and their subcategories—similar to those used in the most recent CSFII.<sup>32</sup> Major food groups included:

- **Milk**—breastmilk, infant formula, cow's milk with varying fat content, and soy and goat's milk.
- **Grains and grain products**—breads, rolls, biscuits, bagels, and tortillas; cereals and granola bars; crackers, pretzels, and rice cakes; pasta and rice; pancakes; and other grains.
- **Fruits**—100% fruit juice, baby food fruits, and non-baby food fruits. Fruits are categorized by how the fruit was prepared (baby food fruits, canned, fresh and dried) and type (e.g., bananas, pears, peaches, berries).
- **Vegetables**—100% vegetable juice, baby/toddler vegetables, and cooked or raw vegetables. Subcategories include how the vegetable was prepared (baby food, cooked, and raw) and color (dark green, deep yellow).
- **Meat and other protein sources**—subcategories included baby food and non-baby food meats; beans and peas; eggs; peanut butter, nuts, and seeds; cheese and yogurt. Meats are further categorized by type of meat (e.g., chicken, pork).
- **Mixed dishes**—a variety of foods that typically combine a grain with a protein source, and sometimes also a vegetable. Subcategories include: sandwiches; soups; spaghetti; baby food dinners; beans and rice; macaroni and cheese; pizza; and burrito, taco, enchilada, and nachos.
- **Sweets, sweetened beverages, and desserts**—sweetened beverages include carbonated soda, lemonade, and 10% fruit drinks; desserts include cakes, cookies, and pies; and sweets such as candy, sugar, syrups, preserves.
- **Salty snacks**—potato chips, popcorn, cheese curls/puffs, tortilla chips, corn chips, and other types of chips and salty snacks.

*Hispanics and non-Hispanics were remarkably similar in their early food and flavor experiences. Children were eating more fruits (including 100% juice) than vegetables and one in four toddlers was not consuming a single vegetable on a given day.*



## More Similar Than Different

The food consumption patterns of Hispanic infants and toddlers may reflect cultural beliefs and practices as well as environmental determinants. Foods such as rice, soups, tortillas, and beans are common among many Hispanic cultures and were introduced as early as the second half of the first year of life during the transition from infant foods to table foods.<sup>33</sup> Because Hispanics are the single largest ethnic group in the United States, health practitioners should be aware of their food beliefs and practices, and dietetics professionals can help ensure that foods chosen contain the needed nutrients.

Regardless, Hispanics and non-Hispanics were remarkably similar in their early food and flavor experiences. Children were eating more fruits (including 100% juice) than vegetables and one in four toddlers was not consuming a single vegetable on a given day. They were more likely to be eating sweet-tasting fruits, fatty foods such as french fries, and starchy vegetables, and less likely to be eating bitter-tasting dark green vegetables. Hispanic infants 6–11 months were more likely to be consuming fruit in its fresh form compared to non-Hispanics, a preference that should be fostered among toddlers and preschoolers—fresh fruit is an important source of vitamins, minerals and fiber.

National trends suggest that health care practitioners, dietetics professionals, and parents should be concerned about toddlers' energy intakes and food consumption with respect to risk of overweight. The early introduction of sweetened beverages is one dietary practice that could be targeted for improvement, along with encouraging the increased intake of fruits and vegetables. Research has shown that new foods must be offered several times to an infant transitioning from liquid to solid foods.<sup>34–35</sup> Parents and caregivers should be encouraged to increase exposure to flavors and textures, and to offer foods such as vegetables and fruits in a positive manner.

Good nutrition in infancy and toddlerhood promotes quality growth and the establishment of healthy eating habits that discourage the development of obesity and disease later in life. Understanding cultural feeding practices and food preferences allows



## Overweight Trends

Nationwide in 2002, Hispanics were the largest ethnic group participating in WIC, representing 38% of all WIC clients.<sup>36</sup> A study of WIC participants in New York City found that Hispanic two-year-olds were more than twice as likely to be overweight than other racial/ethnic groups, and that overweight was even higher among the 3–4-year-olds.<sup>37</sup> The increase in overweight from toddlerhood to age 3–4 years suggests that the preschool period is an opportune time to educate families about healthful eating habits that can prevent overweight and obesity.

healthcare professionals to offer meaningful support to parents and caregivers in their efforts to provide the best for their children. •

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